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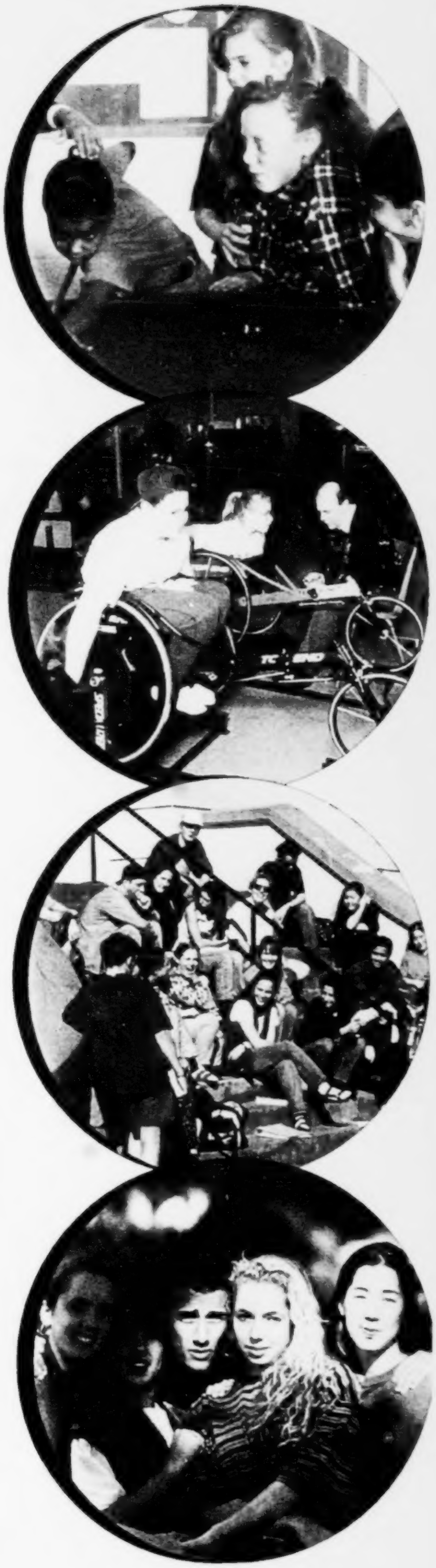
A National Assessment of Effects of School Experiences on Health Outcomes and Behaviours of Children



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A National Assessment of Effects of School Experiences on Health Outcomes and Behaviours of Children

Technical Report

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Executive Summary

Objectives

Central to the concept of schooling is the recognition that students' positive social bonds with schools are highly related to their well-being in terms of (a) academic performance, (b) social behaviours, and (c) physical and mental health. With the availability of the data from the Cross-National Survey on Health Behaviours in School-Aged Children (HBSC), we examined the effects of school experiences on a number of health outcomes and behaviours of Canadian youth.

Method

The HBSC data contain students enrolled in Grades 6 to 10 at the time of the survey. Canadian sample sizes were 2,112 students in the sixth grade, 2,056 students in the seventh grade, 2,225 students in the eighth grade, 2,362 students in the ninth grade, and 2,517 students in the tenth grade. We identified 24 health outcomes and behaviours as dependent variables in our analysis. These dependent variables formed eight categories: substance use (use of drugs, use of alcohol, frequency of drinking, drunkenness, use of tobacco, frequency of smoking and amount of smoking), injury (injury with medical treatment and injury without medical treatment), leisure activities (time spent on television and computer games, frequency of exercise, and hours of exercise) nutrition (more healthy food, less healthy food, and breakfast), dental hygiene (brushing teeth and flossing teeth), self (self-esteem, helplessness and body image), interpersonal relationship (number of close friends and making friends), and health (physical health and mental health).

Independent variables included a number of student-level and school-level variables (used as predictors of health outcomes and behaviours of students). Student-level variables included gender, age, mother's socio-economic status (SES), father's SES, number of parents, and academic status. We constructed 12 school-level variables in two categories. School context variables included school mean mother's SES and school mean father's SES. School climate variables included presence of positive circle of friends, presence of negative circle of friends, peer environment, academic press (expectations), fair school rules, student skipping class, school safety, child–parent relationship, parental involvement, and sense of belonging to school. Because most health outcome measures were dichotomous, we employed multilevel logistic models in our analysis. The first-level model was the student model, and the second-level model was the school model.

Recent Health Status of Canadian Students

Concerns have arisen about Canadian students' substance use (seven outcome measures on use of drugs, alcohol and tobacco). An obvious increasing trend toward substance use has been observed in each and every outcome measure on substance use (seven in total) across grade levels. Canadian students' substance use increases as they grow older.

Injury (both serious and minor) shows a slight growth with the peak in Grade 9. All three measures of leisure activities peak in Grade 7. Canadian students spend less time watching display screens when they grow older, but also spend less time on physical activities – Canadian students are living an inactive life.

Nutrition status of Canadian students highlights the obvious decline in eating breakfast across grade levels. Students' intake of more healthy food and less healthy food basically remains moderate and consistent across grade levels. Canadian students' dental hygiene remains positive and basically consistent across grade levels on brushing teeth, but the use of dental floss is rare among Canadian students across grade levels.

Canadian students show increasing concerns about their body image – an obvious growth of worrying across grade levels. Meanwhile, their self-esteem declines slightly across grade levels. There is no serious concern about feeling helplessness among Canadian students.

Interpersonal relationship is satisfactory among Canadian students. Their chance of having more than two close friends and making new friends looks positive and consistent across grade levels. One of the serious concerns about Canadian students is their health. Both their physical and mental health declines across grade levels.

Factors That Affect Substance Use

Number of parents and academic status emerge as the single most important predictors of use of alcohol. Students from single-parent families or with lower academic status are more likely to drink alcohol than students from both-parent families or with higher academic status. Academic status emerges as the single most important predictor of smoking. Lower academic status is related to higher likelihood of smoking. Number of parents and gender are also critical predictors of smoking, with concerns about students from single-parent families and female students. Substance use is much more strongly related to school experiences. Characteristics of schools in which students are less likely to use substances can be described as (a) positive circle of friends,

(b) positive sense of belonging to school and (c) positive parental support. The single most important school experience that dominates all seven outcome measures on substance use is the circle of friends, crucial in all grade levels.

Factors That Affect Injury

Overall, student injury (either serious or minor) is not closely associated with either their individual characteristics or their school experiences. Safety education is necessary regardless of students' individual and school background.

Factors That Affect Leisure Activities

At the student level, gender emerges as the single strongest predictor of leisure activities. Male students spend more time watching display screens than female students. On the other hand, female students spend less time in physical activities than male students. There is the public concern about students' watching display screens excessively. We suggest that schools can help alter this unhealthy lifestyle. Characteristics of schools in which students spend less time on display screens can be described as (a) positive peer influence, (b) fair school rules and (c) positive sense of belonging to school.

Factors That Affect Nutrition

At the student level, gender emerges as the single strongest predictor of eating breakfast. Male students are more likely to eat breakfast than female students. Student background characteristics are not important predictors of "more healthy food" intake, but gender emerges as the single strongest predictor of "less healthy food" intake. Male students consume more "less healthy food" than female students. Effective schools where students report better nutrition can be characterized as having (a) strong parental support and (b) positive peer influence.

Factors That Affect Dental Hygiene

At the student level, gender emerges as the single strongest predictor of dental hygiene. Female students are more likely to brush and floss teeth than male students, with the gender gap increasing consistently across grade levels. School experiences positively promoted dental hygiene. Characteristics of schools in which students showed better dental hygiene can be described as (a) positive disciplinary climate, (b) positive peer environment and (c) positive sense of belonging to school.

Factors That Affect Self

At the student level, academic status is the single strongest predictor of feeling helpless. Lower academic status is related to stronger feeling of helplessness. Students from single-parent households also experience more helplessness than students from both-parent households. Gender turns out to be the single strongest predictor of worrying about body image. Female students are more likely to worry about body image than male students, with the gender gap increasing consistently across grade levels. Gender also turns out to be the single strongest predictor of self-esteem. Male students shows higher self-esteem than female students. Characteristics of schools in which students develop healthier self-perceptions can be described as (a) strong parental support, (b) high academic press (expectations) and (c) positive peer influence.

Factors That Affect Interpersonal Relationships

There is a lack of effects of student-level variables on the well-being of student interpersonal relationships. In contrast, school experiences have major impact on student interpersonal relationships. Effective schools where students report more positive interpersonal relationships can be characterized as having (a) positive sense of belonging to school, (b) high academic press (expectations) and (c) strong parental involvement. Parental involvement and academic press show more important effects on interpersonal relationships than sense of belonging to school.

Factors That Affect Health

At the student level, gender emerges as the single strongest predictor of both physical and mental health, in favour of male students in both cases. Characteristics of schools in which students are healthier physically and mentally can be described as (a) positive disciplinary climate, (b) positive child–parent relationship and (c) positive peer environment.

Recommendations for Parents

- Parents participate in the school-wide, long-term, parent-involved campaign against the use of drugs, alcohol and tobacco.
- Parents educate their children and monitor their children's activities outside school to prevent injury.
- Parents convince female children to have breakfast regularly and offer healthy snacks directly (rather than provide snack allowance) to male children to reduce their intake of less healthy food.
- Parents praise their children's school accomplishment (e.g. academic achievement, athletic awards, special talents and prosocial behaviours) to help them reduce the feeling of helplessness, alleviate the worrying about body image and develop positive self-esteem.
- Parents help their children develop interpersonal relationship (e.g. creating opportunities for their children to meet others and instructing their children in interpersonal relationship skills).
- Parents develop harmony relationships with their children to help improve their physical and mental health.

Recommendations for Schools

- School staff target students with low academic status to reduce the use of drugs, alcohol and tobacco and alleviate the feeling of helplessness.
- School staff target students from single-parent families to reduce the use of drugs, alcohol and tobacco and alleviate the feeling of helplessness.
- School staff target male students to reduce the time spent on watching display screens and improve dental hygiene.
- School staff target female students to reduce the use of tobacco, increase the amount of physical activities, have breakfast regularly, reduce the feeling of helplessness, alleviate the worrying about body image, develop positive self-esteem and improve physical and mental health.

- School staff influence peer groups and create a positive peer environment (with measures such as awareness programs, close adult supervision of negative social circles, reward programs, tough sanctions with the support of families and communities, and counselling of the leading members of a negative social circle).
- School staff improve students' sense of belonging to school (with measures such as performing lunch duties, collecting homework assignments, arranging field trips, supervising younger students in lower grade levels and contributing special talents to school events).
- School staff work toward a safe school disciplinary environment with clear and fair rules.
- School staff involve students in the development of school rules.
- School staff monitor students' activities inside school to prevent injury.
- School staff develop extracurricular programs to reduce students' time watching display screens.
- School staff make age-appropriate and gender-appropriate physical activities available to female students and attract them to participate.
- School staff work with school nurses and nutrition experts to develop healthy lunch menus in school (including snacks available in school).
- School staff work closely with parents to improve health outcomes and behaviours of students (with measures such as parent council, workshops for parents on health issues, regular formal teacher–parent conferences and regular informal teacher–parent contacts).
- School staff hold high academic expectations for students and provide appropriate support for students to achieve them (with measures such as more relevant homework assignments, individual tutoring by teachers, qualified parents and advanced capable students, study buddies programs and cooperative learning among students).

Recommendations for Education Policy

- Restore school health education curriculum to develop adequate health literacy among students – the knowledge, values, attitudes and beliefs necessary for health supportive decision making.
- Provide adequate training for school staff on health promotion and intervention.
- Create (at least) mobile school nurses positions to provide guidance and assistance to school health promotion and intervention.

Recommendations for Public Health Policy

- A family health strategy (focusing on parental awareness, training for parents, and parental involvement) is needed to target specific vulnerable groups of students (e.g. students with low academic status and students from single-parent families) to improve health outcomes and behaviours of students.
- A school health strategy (with strong commitment of school staff) is needed to utilize school experiences (e.g. circles of friends, sense of belonging to school, extracurricular activities, and academic expectations) to influence health outcomes and behaviours of students.

Recommendations for Social Services Policy (Social Support Systems)

- Involve parents and schools in the prevention and intervention of adverse health outcomes and behaviours of students.
- Provide professional resources to assist parents and schools in their use of family and school experiences to influence health outcomes and behaviours of students.

1 Critical Review of Literature

The past two decades have witnessed a remarkable expansion in ideas, experiments, projects, and programs that has greatly extended our understanding of the factors that influence young people's health, health-related behaviours and strategies to change their behaviours. This situation has promoted the recent formation of the framework on the determinants of health that has led a reappraisal of inputs and directions in programs aimed to improve the health status of young people. More emphasis is now being given to the underlying causes of good and poor health, and consequently to the underlying factors associated with physical and social environments. At the same time, economic and political constraints on health have become more important in the thinking of those concerned with promoting the health of young people (see Nutbeam, Haglund, Farley, & Tillgren, 1991).

Health Concerns About Adolescents

Adolescents are in a developmental period that has been characterized by high stress and emotional upheaval (Arnett, 1999). Particularly in Western and North American countries, teens and early twenties are the years marked with the highest prevalence of a wide range of risk behaviours that carry the potential to harm both self and others (Arnett, 1992; Moffitt, 1993). Substance abuse (e.g. drugs, alcohol) and delinquency are both higher among adolescents than among adults (Steinberg, 1993). Adolescents tend to engage in risk behaviours (e.g. crime, substance abuse, risky sexual behaviour) more and in a wider variety of ways than both children and adults and, in addition, depression, suicide, emotional disorder, eating disorders and conduct disorder all peak during adolescence (Kazdin, 2000; Steinberg, 1993). All these health concerns lend further validity to the perception of adolescence as a risky and difficult developmental period (Arnett, 1999).

A significant number of adolescents suffer serious psychological and behavioural problems (Steinberg, 1993). Using current diagnostic criteria and rigorous assessment measures, studies conducted in Canada, New Zealand, Puerto Rico and the United States have shown fairly consistent results on the prevalence of psychiatric disorders within the adolescent population. Among 4-year-olds to 18-year-olds, about 17% to 22% suffer significant developmental, emotional or behavioural disorders (Costello, 1989; Institute of Medicine, 1989; Zill & Schoenborn, 1990; the U.S. Congress, 1991). Furthermore, among adolescents being treated clinically, about 40% to 60%

drop out without any regard to the advice of clinicians (Kazdin, 1996; Wierbicki & Pekarik, 1993). There is a pervasive belief among counsellors that adolescents are the most difficult clients to work with (Church, 1994).

Lifestyle Concerns About Adolescents

Unfortunately, health concerns about adolescents are often negatively enhanced by the lifestyles in which current adolescents popularly engage. Health outcomes largely the product of lifestyle choices, and these choices begin to be made before adulthood (Lammers, 1996). There has been an increase in risk factors related to lifestyle choices across the United States (Taubert, Moller, & Washington, 1996).

The most obvious examples are the use of tobacco which still attracts 30% of high school seniors every year, the increase in time spent watching display screens, and the increasing consumption of popular food (less healthy food such as fried food) in the lives of young people. Although the Expert Panel on Blood Cholesterol Levels in Children and Adolescents in the National Cholesterol Education Program recommends a maximum of 30% of total dietary calories from fat, "the average American child ... ages 6 to 19 had 35% total daily diet calories from fat," with school lunches averaging 40% of calories from fat (Taubert, Moller, & Washington, 1996, p. 13). In addition to the development of these unhealthy eating patterns, "the level of physical activity has decreased [in the past two decades] and more children are living a sedentary lifestyle" (Taubert, Moller, & Washington, 1996, p. 13). Based on current mortality trends, Taubert, Moller, & Washington, (1996) predicted that almost half of the children currently living in the United States will die from stroke and heart disease in their adult life. To prevent adverse health outcomes in adult life, educators and schools are encouraged to emphasize interventions that "focus on increasing motivation for physical activity and exercise" (Wolinsky, Stump, & Clarke, 1994, p. 462).

Determinants of Health Among Adolescents

The precede-proceed model of health promotion (see Green & Kreuter, 1991) emphasizes two fundamental propositions: (a) health is a result of multiple factors, and (b) because health is determined by multiple factors, efforts to promote positive health outcomes and behaviours must be multidimensional involving multiple social sectors. Nutbeam et al. (1991) also believed that multiple factors contribute to the health of adolescents. The framework on the determinants of health has highlighted a broad range of factors – ranging from personal characteristics to family circumstances to physical and social environments – that interact to affect health outcomes and behaviours (Health Canada, 1999).

Personal characteristics can be reasonably summarized into four dimensions: (a) biological (e.g. genetic traits), (b) individual (e.g. gender), (c) cognitive and affective (e.g. health knowledge) and (d) practical (e.g. coping skills). Data available for analysis in the current study provide some good measures on the individual and cognitive dimensions. Gender represents differential attitudes, behaviours, values, personality traits and social roles. Many health issues, such as dieting, smoking and sexually transmitted diseases, are a function of these gender-based roles, with the majority of them being established in adolescence. Academic ability of students often causes stress and helplessness among students which affect the status of their mental health.

Family characteristics describe the home environment that either facilitates or hinders positive health outcomes and behaviours of adolescents. Socio-economic status (SES) has been considered a powerful indicator of home environment, and it has been consistently identified as one of the most important determinants of health. There is conclusive evidence that people from higher SES are healthier and live longer than those from lower SES. SES affects parents' economic ability to carry out home functions and family responsibilities that have direct consequences on health outcomes and behaviours of their children. Data available for analysis in the current study contain some key measures on family socio-economic characteristics.

Environmental characteristics portray (a) the physical (e.g. air and water quality), (b) the social (e.g. social support and neighbourhood safety) and (c) the cultural (e.g. traditional practices and cultural norms) conditions under which individuals carry out their daily functions. For example, living in a safe, supportive community can help reduce stress, and certain cultural values are known to be in conflict with some health-promoting principles. Data available for analysis in the current study include a good number of important measures on the social environment of adolescents, namely their school environment. Given that students spend most of their daily time in school interacting with administrators, teachers and peers, school experiences are hypothesized to have a critical impact on health outcomes and behaviours of adolescents, over and above individual differences in health outcomes and behaviours.

The framework on the determinants of health (together with the precede-proceed model of health promotion) has helped us identify individual, family and, mostly importantly, school related characteristics thought to have important influences on health outcomes and behaviours of adolescents. Specific studies to be discussed in the following literature review help illustrate this importance by providing empirical research evidence.

Critical Role of Schools in Promoting Adolescent Health

Educators and schools play an important role in children's health outcomes. As stated in *Healthy Schools, Healthy Children, Healthy Futures: The Role of the Federal Government in Promoting Health Through the Schools* (Cohen et al., 1992), representatives from several federal agencies and a national organization testified about the importance of schools in promoting health outcomes of children before the Committee on Government Affairs, United States Senate. The critical role of educators and schools is also emphasized in *Schools and Health: Our Nation's Investment* (Allensworth, Wyche, Lawson, & Nicholson, 1997). Healthy children are more effective learners – "a student who is not healthy ... is a student who will not profit from the educational process" (Michael McGinns, cited in Allensworth & Kolbe, 1987). Marx (1998) stated that "educational reforms will be effective only if students' health and well-being are identified as contributors to academic success and are at the heart of decision and policy making" (p. 293).

Schools can use health education curricula and health promotion programs to develop health literacy – the knowledge, values, attitudes and beliefs necessary for health-supportive decision making. Most adverse health outcomes can be effectively prevented through the "development of knowledge, positive attitudes, and healthy behaviours" (Lammers, 1996, p. 278), which health education curricula seek to achieve with knowledge of proper nutrition, drug awareness and appreciation of exercise. An unfortunate reality is that health education has been reduced to one semester in high school in several Canadian provinces. The bilateral connection that health is a determinant of learning and learning is a determinant of health needs to be fully developed in Canada.

Existing health education curricula and health promotion programs (e.g. physical fitness and drug awareness) in North America are not as effective as one might expect (see Lammers, 1996). For example, after examining eighth-grade students who had participated in a comprehensive elementary health education curriculum, Lammers (1996) concluded that "overall, the curriculum effects were not apparent on the majority of health behaviours" (p. 280). Ignico and Mahon (1994) investigated the effects of physical fitness programs on low-fit children, and reported that health indicators such as body fatness, cardiovascular responses to exercise and blood lipid profiles showed no significant improvement. Both studies suggest that the potential benefits of health programs were minimized by factors outside the programs, such as unhealthy diet, lack of additional physical activities and negative cultural norms. A more important reason why some educational efforts are not as effective in promoting positive health outcomes and behaviours as one might expect, however, may well be within the school.

A supportive school environment can help develop health-enhancing behaviours. Students tend to experience more satisfaction with their schools when they feel safe, are fairly treated, and are supported by their teachers (Samdal, Nutbeam, Wold, & Kannas, 1998). In contrast, where students are dissatisfied with their schools because of low student autonomy and unreasonable teacher expectations, they are more likely to engage in smoking and drinking (Samdal, Wold, Klepp, & Kannas, 1998). In general, students tend to be more likely to engage in health-compromising behaviours when they experience alienation in school (Nutbeam, Smith, Moore, & Bauman, 1993; Jessor, 1991; Nutbeam & Aaro, 1991; Nutbeam, Aaro, & Catford, 1989). In this sense, a non-supportive school environment can constitute a health risk to students.

Goff and Torrance (1991) observed that positive health outcomes are achieved as a byproduct of meeting cognitive and affective objectives. Working with the rationale that beliefs, feelings, stresses, relationships and conflicts contribute to adverse health outcomes, Goff and Torrance (1991) advocated three different modes of positive behaviour: imagery, visualization and creativity. They argued that these modes can be brought into the classroom as imaginative play with such benefits as reducing alienation and enhancing mental health. Birkimer, Druen, Holland and Zingman (1995) found that positive self-comments, thoughts and feelings significantly predict healthy behaviours such as vigorous exercise, use of seat belts and avoidance of alcoholic beverages. These findings indicate that it is not enough to realize the potential benefits of healthy eating patterns and active lifestyle choices. Educators and schools must identify social and environmental factors that influence the development of student lifestyle. Although few examples exist to demonstrate this point (a major weakness of the literature), the culture-specific approach taken for American Indian students is worth discussing (see Davis, Lambert, Gomez, & Skipper, 1995). After monitoring the behaviours of elementary students in two American Indian tribal groups which had participated in the program, these researchers stated that "a culturally appropriate school-based intervention is successful in increasing short-term knowledge of cardiovascular health and in changing targeted risk behaviours related to diet, exercise, and tobacco use" (p. 80).

With the concept of schooling processes, we employed the "input-process-output" model widely used in the research of school effects. In such a model, schools are viewed as "processing," through school context and school climate, students with differing background (e.g. gender, SES, race-ethnicity, family structure, family size and handicap status) so that students demonstrate differential outcomes (in, for example, academic performance, health, attitude and aspiration). Therefore, researchers using this model carefully control the characteristics of student background, examine the distribution of outcomes across students and schools, and identify salient schooling processes that channel students into differential categories of outcomes.

A unique aspect of the current study is that we used this input-process-output model within the conceptual framework of "psychosocial school environment" (see Samdal, 1998) to examine the relationship between school experiences and student health outcomes and behaviours. The concept of psychosocial school environment is based upon school effects research and adult work environment research. School effects research mainly focuses on school and classroom factors that are alterable from the perspective of educators in order to improve schooling outcomes. Research into adult work environment has focused on dimensions in the work environment that are important to productivity, job satisfaction and health behaviours (including perceived well-being). The current study incorporates elements from both strands of research to capture aspects of the psychosocial school environment that are important to students' health outcomes and behaviours.

Karasek and Theorell (1990) reported that some aspects of the psychosocial work environment are significantly related to higher productivity, higher job satisfaction, lower incidence of health-compromising behaviours and more positive perceived well-being. They listed these aspects as: (a) high autonomy and control, (b) reasonable demands, and (c) good social support from co-workers and administrators. Note that research in adult work environment typically employs indicators of work environment as perceived by individual workers (Tagiuri, 1968).

In the school environment, the student notion of autonomy and control is often based on the perception of school rules. If students perceive school rules to be fair and relevant, particularly if they feel they can influence their learning conditions, they develop positive school experiences adjusting themselves to the school environment (Mortimore, 1998). For students, social support may come from three sources: peers, parents and school staff. Warm and positive support from these sources constitutes satisfactory and fulfilling school experiences.

Positive and satisfactory school experiences are important because they lead to positive development in self-esteem. On the contrary, negative experiences about school often lead to alienation and disengagement from school. As a result, students may try to find friends outside school to share their negative attitudes and perceptions and engage in health-compromising behaviours (Hawkins, Catalano, & Miller, 1992). Buysse (1997) and Jessor (1991) found that when feeling lack of influence, students tend to resort to sub-cultures where members typically engage in the use of drugs, alcohol and tobacco.

II Objectives of the Current Study

Adopting the conceptual orientation of psychosocial work environment, we employed the framework of the determinants of health (together with the precede-proceed model of health promotion) to help us identify environmental variables at the school level in the current study. With these variables, we examined how certain aspects of school experiences are associated with a wide range of student health outcomes and behaviours. Specifically, school climate included such factors as circles of friends, peer environment, perception of the fairness of school rules, perception of school safety and parental involvement. We considered these school-level variables as essential elements in the reinforcing process as indicated in the precede-proceed model of health promotion (Green & Kreuter, 1991), and we hypothesized that these variables have effects on student health outcomes and behaviours over and above individual differences in health outcomes and behaviours. Student health outcomes and behaviours included substance use, injuries, leisure activities, nutrition, dental hygiene, self, interpersonal relationship and physical and mental health. Analytically, the input-process-output model was used to link student health outcomes and behaviours with their school experiences variables. Consequently, we believe that there is both conceptual and analytical aptness in the current study, which gives us greater confidence in the upcoming results.

Central to the concept of schooling is the recognition that students' positive social bonds with schools are highly related to their well-being in terms of (a) academic performance, (b) social behaviours and (c) physical and mental health. However, Simons-Morton, Crump, Haynie, and Saylor (1999) have criticized that so little scientific attention has been given to the complex interactions between students and school environment that there is little working knowledge for policymakers regarding how school experiences affect students' health outcomes and behaviours. With the availability of the data from the Cross-National Survey on Health Behaviours in School-Aged Children (HBSC), we attempted to fill in this gap in the research literature. In the current study, we examined the effects of school experiences on a number of health outcomes and behaviours of youth using the input-process-output model of school effects.

III Method

Data Sources

We used the Canadian data from the 1998 Cross-National Survey on Health Behaviours in School-Aged Children (HBSC) for a comprehensive examination of the effects of school experiences on health outcomes and behaviours of Canadian students. The HBSC data contain students enrolled in Grades 6 to 10 at the time of the survey. This grade span over elementary and secondary schools allowed us to examine the effects of school experiences in a cross-sectional manner. The HBSC adopted a systematic, single cluster sampling procedure with the sampling unit being the school class. In this procedure, a sample of classes were first chosen in each of Grades 6 to 10, then all children born between January 1 and December 31 in 1982 to 1986 in those classes (in Grades 6 to 10) was selected. Sample sizes were 2,112 students in the sixth grade, 2,056 students in the seventh grade, 2,225 students in the eighth grade, 2,362 students in the ninth grade and 2,517 students in the tenth grade.

This sampling procedure resulted in data hierarchy–children nested within schools. Data analysis must take this data hierarchy into account. We employed multilevel modelling techniques to accommodate the nested structure of the HBSC data (see Bryk & Raudenbush 1992; Goldstein, 1998). Multilevel modeling techniques allowed us to separate individual effects from school effects so that school effects are estimated as the effects over and above individual effects. The emphasis of the current study was to identify the aspects of the school social environment (school climate), which are correlated with health outcomes and behaviours of students.

Variables and Measures

We identified 24 health outcomes and behaviours as *dependent variables* in our analysis. These dependent variables formed eight categories: substance use (use of drugs, use of alcohol, frequency of drinking, drunkenness, use of tobacco, frequency of smoking and amount of smoking), injury (injury with medical treatment and injury without medical treatment), leisure activities (time spent on television and computer games, frequency of exercise and hours of exercise), nutrition (more health food, less health food and breakfast), dental hygiene (brushing teeth and flossing teeth), self (self-esteem, helplessness and body image), interpersonal relationship (number of close friends and making friends), and health (physical health and mental health). A detailed description of the information that we used to construct these dependent variables is presented in Appendix 1.

Most of these health outcome measures were constructed into dummy (0, 1) variables to facilitate the use of probability to describe the health events of interest as conventional in the medical research. The other reason was that most items in the HBSC were constructed in irregular scales; that is, intervals between choice options are not equal. This situation created a lot of difficulties for interpretation. Not only did the use of dummy variables resolve the problem of irregular scales, but it also allowed us to focus our analysis on the most important aspect of each health outcome. The drawback of constructing dummy outcome variables is that it reduces the data to consideration of either presence or absence of a certain event at the expense of the degree to which the event occurs.

To create appropriate dummy health outcome measures, we relied on the general principles of healthy living (e.g. one needs to brush teeth after each major meal and floss teeth every day to maintain good dental hygiene). We also relied on the characteristics of the data (e.g. it was not meaningful to estimate the probability of drinking at least weekly because the data showed that very few students drank every week, not to mention every day). Finally, we intentionally decided to be as specific as possible when we constructed health outcome measures in order to obtain some in-depth understanding of the phenomena we were investigating. For example, instead of combining brushing teeth and flossing teeth into a general measure of dental hygiene, we created separate outcome measures to gain in-depth, specific understanding of students' dental behaviours.

In some cases where specific details are not of interest to researchers and policymakers, we combined items into a general construct. For example, we combined food items (e.g. milk, juice, fries, meat) to form outcome measures, "more healthy food" and "less healthy food." In total, we constructed five outcome measures based on multiple items. Whenever we combined items together, we ran reliability analyses. Appendix 3 shows reliabilities across grade levels for each of these outcome measures.

Independent variables include a number of student-level and school-level variables (used as predictors of health outcomes and behaviours of students). Student-level variables included gender, age, mother's socio-economic status (SES), father's SES, number of parents, and academic status. Gender was renamed as female, coded female = 1 and male = 0. We included two measures of SES created on the basis of parental occupation. Occupational categories were coded following Duncan's socio-economic indexing, and then were normalized following the standard statistical procedure (Mosteller & Tukey, 1977). We created two separate socio-economic measures, one for mother and the other for father, to examine the potentially differential impact of mother's and father's SES on outcome measures. Number of parents ranged from not living with any parents to living with both parents. Academic status was a measure of a student's perception of his or her academic position in comparison to others.

In addition to these student-level variables, there were school-level variables. Because, in the HBSC, all information was obtained from individual students, we aggregated the student-level information to the school level. Therefore, all school-level variables were average values of variables among students in a school. We constructed 12 school-level variables in two categories. School context variables included school mean mother's SES and school mean father's SES. School climate variables included positive circle of friends, negative circle of friends, peer environment, academic press, fair school rules, student skipping class, school safety, child–parent relationship, parental involvement and sense of belonging to school.

Positive circle of friends describes the extent to which a student's friends value schooling, academic work and a good relationship with parents, whereas negative circle of friends describes the extent to which a student's friends use substances (drugs, alcohol and tobacco) and carry weapons. Peer environment portrays the nature of the social environment in which students interact with one another (enjoying being together, being kind and helpful, and having mutual respects). Academic press depicts the academic expectations that school staff hold for their students and the academic attitudes that school staff have toward their students. Fair school rules describes student perceptions of school rules as being fair. Student skipping class measures the frequency of students skipping classes. School safety portrays student perceptions of school as being a safe place. Child–parent relationship measures how comfortably students interact with their parents and how positively students feel about their parents. Parental involvement portrays how actively parents get involved with their children's education. Sense of belonging depicts the extent to which students value their membership with the school.

A detailed description of these school-level variables is presented in Appendix 2. Some of these school-level variables were constructed based on multiple items, and Appendix 3 presents reliabilities for these school-level variables across grade levels. To improve students' health outcomes and behaviours through schooling, these school climate variables are important targets of investigation because they can be controlled directly by politicians, administrators, educators and parents.

Statistical Procedures

The systematic, single cluster sampling procedure used in the HBSC resulted in different sample sizes in different schools (students nested within schools), producing large sampling errors. Multilevel modelling is the most appropriate statistical technique for hierarchical data, taking into account sampling error and measurement error. Therefore, we developed a series of (two-level) multilevel statistical models to examine the relationships between health outcomes and behaviours and various student-level and school-level variables. Specifically, because most health outcome measures were dichotomous, we employed multilevel logistic models in our analysis. The first-level model was the student model, and the second-level model was the school model.

Multilevel modelling was conducted in three stages. In the first stage, the "null" model (with no predictors at either student level or school level) was fitted to the data to partition the total variance in an outcome variable into between-student and between-school components. The results indicate the extent to which the variation in a particular health outcome or behaviour was attributable to differences among students and among schools. In the second stage, a student-level model was developed (without predictors at the school level) where we explained the variation in each health outcome or behaviour among students with student-level variables. The purpose was to examine the effects of student characteristics on their health outcomes and behaviours. Students within each school provided a school average measure on a particular health outcome. In the third stage, school context and climate variables were added to model these school average measures (one for each school) on the particular health outcome. This model constituted the "full" model that estimated not only effects of student-level variables but also effects of school-level variables over and above those of student-level variables. The same procedure of analysis was carried out for each of the grade levels to detect patterns of changes across grade levels.

Because we either centred or standardized student-level variables, the grand mean of the multilevel model became a meaningful measure of a particular health outcome for what is often referred to as the "typical student" with nationally average characteristics (in terms of gender, age, mother's SES, father's SES, number of parents and academic status). As a national average measure on that particular health outcome, this estimate is useful and important.

IV Results

In the current study, we classified 24 health outcome measures into eight categories (mainly for the convenience of interpretation): substance use, injury, leisure activities, nutrition, dental hygiene, self, interpersonal relationship and health. Because most health outcome measures were dichotomous with a value of 1 indicating the presence of a health event and 0 indicating the absence of the event, multilevel logistic techniques were used (students nested within schools).

Substance Use

Table 1 presents descriptive statistics on all health outcome measures on substance use, including use of drugs, use of alcohol, drinking at least monthly, drunken at least once, smoking, smoking every day, and number of cigarettes smoked weekly (see Appendix 1). Table 1 in general shows an increase in all substance uses as students went through their education. These descriptive statistics were calculated based on raw data without any statistical adjustment over sampling error and measurement error. Therefore, their interpretation needs considerable caution. Multilevel modelling techniques, on the other hand, take into account sampling error and measurement error, thus providing "true" estimations on probabilities of health outcome measures and on student and school effects on health outcome measures.

Table 2 presents estimated probabilities on substance use for the typical student with nationally average characteristics in various grade levels. As mentioned earlier, each probability is a national average measure on substance use in a certain grade level. The results show that the typical student was about 28% likely in Grade 8, about 34% likely in Grade 9 and about 45% likely in Grade 10 to use drugs. Information on use of drugs was not sought from students in Grades 6 and 7.

The typical student was about 68% likely in Grade 6, about 81% likely in Grade 7, about 84% likely in Grade 8, about 90% likely in Grade 9 and about 94% likely in Grade 10 to have drunk alcohol at least once.

The typical student was about 9% likely in Grade 6, about 13% likely in Grade 7, about 23% likely in Grade 8, about 34% likely in Grade 9 and about 45% likely in Grade 10 to drink at least monthly.

The probability for the typical student to get drunk at least once was about 8% in Grade 6, about 14% in Grade 7, about 26% in Grade 8, about 42% in Grade 9 and about 58% in Grade 10.

The typical student was about 18% likely in Grade 6, about 31% likely in Grade 7, about 44% likely in Grade 8, about 56% likely in Grade 9 and about 66% likely in Grade 10 to have smoked at least once.

The probability for the typical student to smoke every day was about 1% in Grade 6, about 3% in Grade 7, about 7% in Grade 8, about 13% in Grade 9 and about 18% in Grade 10.

The typical student smoked about 0–1 cigarette weekly in Grade 6, about 1–2 cigarettes weekly in Grade 7, about 4–5 cigarettes weekly in Grade 8, about 7–8 cigarettes weekly in Grade 9, and about 11–12 cigarettes weekly in Grade 10.

Use of drugs. What student characteristics and school experiences were responsible for the variation in substance use measures? We addressed this question by including in the multilevel logistic model a number of explanatory variables that represent student characteristics and school experiences.

Table 3 presents the results on the effects of student-level and school-level variables on substance use. Note that only those variables (at the student and school levels) that were statistically significant at the 0.05 level are reported in Table 3. In our multilevel data analyses, however, we tested all variables at the student and school levels. We presented effects in probability terms as shown in columns labelled as "Exp." Exp denotes the regression result in terms of e raised to the power of each effect, which is the expected change in probability that an event occurs associated with one unit increase in a predictor variable. Some Exp values are greater than 1, whereas others are smaller than 1. To be consistent in interpretation, for any Exp value smaller than 1, its reciprocal (which is greater than 1) was used for interpretation. This strategy allowed us to employ the term "times" consistently to describe the numerical difference in probability, an easier way to understand what happens to the probability that a health outcome occurs with regard to different values (categories) of an independent variable. For economics of space, in the following interpretation, no repetitive explanation was offered each time this strategy was employed.

Older students were more likely to use drugs (see Appendix 1 for description of the outcome measure) than younger students in the same grade level. Consider two students one month apart in age. The older student was about 1.04 times as likely in Grade 8, about 1.05 times as likely in Grade 9 and about 1.02 times as likely in Grade 10 to use drugs than the younger student.

Students living with fewer parents were more likely to use drugs than students living with more parents. Students from single-parent households were about 1.59 times as likely (1 ÷ 0.63) in Grade 9 and about 1.33 times as likely (1 ÷ 0.75) in Grade 10 to use drugs than students from both-parent households.

Students who considered themselves as having lower (or worse) academic status were more likely to use drugs than students who considered themselves as having higher (or better) academic status. Specifically, students considering themselves lower in academic status were about 1.92 times as likely (1 ÷ 0.52) in Grade 8, about 1.85 times as likely (1 ÷ 0.54) in Grade 9 and about 1.75 times as likely (1 ÷ 0.57) in Grade 10 to use drugs than students considering themselves higher in academic status.

There is also evidence in Table 3 that school experiences (see Appendix 2) had effects on student use of drugs. Students in schools with the absence of a positive circle of friends were about 1.89 times as likely (1 ÷ 0.53) in Grade 8 to use drugs than students in schools with the presence of a positive circle of friends.

Students in schools with the presence of a negative circle of friends were about 2.27 times as likely in Grade 9 and about 3.36 times as likely in Grade 10 to use drugs than students in schools with the absence of a negative circle of friends.

Students in schools with high academic press were about 2.56 times as likely (1 ÷ 0.39) in Grade 10 to use drugs than students in schools with low academic press.

Students in schools with unfair school rules were about 1.75 times as likely (1 ÷ 0.57) in Grade 8 to use drugs than students in schools with fair school rules.

Summary on use of drugs. Summaries like this one emphasized significance and consistency of variables. The most statistically significant variables were summarized first, and then variables that showed effects across all or most grades (with a focus on consistency, these variables could be small in effect). The most important variables at the student level were academic status (Grades 8 to 10) and number of parents (Grades 9 and 10). The effect of academic status declines across grades. So does the effect of number of parents. Both academic status and age showed effects in all grade levels where data on use of drugs were available (Grades 8 to 10). Number of parents showed effects in two out of three grade levels (Grades 9 and 10). The most important variables at the school level were negative circle of friends (Grades 9 and 10) and academic press (Grade 10). The effect of negative circle of friends increases over grades. Negative circle of friends was the only variable at the school level with effects in two out of three grade levels.

Use of alcohol. Table 3 shows significant gender differences in use of alcohol (see Appendix 1 and note that use of alcohol here measures whether students have drunk alcohol at least once). Male students were 1.72 times as likely (1 ÷ 0.58) to drink than female students in Grade 7.

Older students were more likely to drink than younger students (in the same grade level). Consider two students one month apart in age. The older student was about 1.04 times as likely in Grade 7 to drink than the younger student.

Students with high mother's SES were about 1.39 times as likely to drink in Grade 9 than students with low mother's SES.

In Grade 7, students living with fewer parents were more likely to drink than students living with more parents. Students from single-parent households were about 2.33 times as likely (1 ÷ 0.43) in Grade 7 to drink than students from both-parent households.

Students who considered themselves as having lower (or worse) academic status were more likely to drink than students who considered themselves as having higher (or better) academic status. Specifically, students considering themselves lower in academic status were about 1.33 times as likely (1 ÷ 0.75) in Grade 7, about 2.13 times as likely (1 ÷ 0.47) in Grade 8, about 1.96 times as likely (1 ÷ 0.51) in Grade 9 and about 1.82 times as likely (1 ÷ 0.55) in Grade 10 to drink than students considering themselves higher in academic status.

At the school level (see Appendix 2), students in schools with the presence of a negative circle of friends were about 3.02 times as likely in Grade 9 and about 2.43 times as likely in Grade 10 to drink than students in schools with the absence of a negative circle of friends.

Students in schools with positive peer environment were about 3.16 times as likely in Grade 8 to drink than students in schools with negative peer environment.

Students in schools with high academic press were about 2.33 times as likely in Grade 10 to drink than students in schools with low academic press.

Students in schools with unfair school rules were about 1.82 times as likely (1 ÷ 0.55) in Grade 6 to drink than students in schools with fair school rules.

Students in schools where they felt safe were about 2.40 times as likely in Grade 10 to drink than students in schools where they felt unsafe.

Students in schools with negative sense of belonging to school were about 4.00 times as likely (1 ÷ 0.25) in Grade 8 to drink than students in schools with positive sense of belonging to school.

Students in schools with higher school mean mother's SES were about 1.44 times as likely in Grade 10 to drink than students in schools with lower school mean mother's SES.

Summary on use of alcohol. The most important variables at the student level were academic status (Grades 7 to 10) and number of parents (Grade 7). The effect of academic status starts small in Grade 7, peaks in Grade 8 and then declines (Grades 8 to 10). Academic status showed effects in four out of five grade levels (Grades 7 to 10). The most important variables at the school level were negative circle of friends (Grades 9 and 10) and peer environment (Grade 8). The effect of negative circle of friends declines across grades. No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Drinking at least monthly. Table 3 indicates significant gender differences in drinking at least monthly (see Appendix 1 for description of the outcome measure). Male students were 1.85 times as likely (1 ÷ 0.54) in Grade 7 to drink than female students at least monthly.

Older students were more likely to drink at least monthly than younger students (in the same grade level). Consider two students in age one month apart. The older student was about 1.03 times as likely in Grade 7, about 1.04 times as likely in Grade 8, about 1.03 times as likely in Grade 9 and about 1.02 times as likely in Grade 10 to drink at least monthly than the younger student.

Students with high mother's SES were about 1.35 times as likely to drink at least monthly in Grade 7 than students with low mother's SES.

Students who considered themselves as having lower (or worse) academic status were more likely to drink at least monthly than students who considered themselves as having higher (or better) academic status. Specifically, students considering themselves lower in academic status were about 1.32 times as likely (1 ÷ 0.76) in Grade 7, about

1.61 times as likely (1 ÷ 0.62) in Grade 8, about 1.52 times as likely (1 ÷ 0.66) in Grade 9 and about 1.47 times as likely (1 ÷ 0.68) in Grade 10 than students considering themselves higher in academic status to drink at least monthly.

At the school level (see Appendix 2), students in schools with the presence of a negative circle of friends were about 1.76 times as likely in Grade 8, about 2.21 times as likely in Grade 9 and about 2.48 times as likely in Grade 10 to drink at least monthly than students in schools with the absence of a negative circle of friends.

In Grade 7, students in schools where child–parent relationship was negative were about 1.49 times as likely (1 ÷ 0.67) to drink at least monthly than students in schools where child–parent relationship was positive.

Students in schools with negative sense of belonging to school were about 2.56 times as likely (1 ÷ 0.39) in Grade 6, about 3.23 times as likely (1 ÷ 0.31) in Grade 7 and about 2.13 times as likely (1 ÷ 0.47) in Grade 8 to drink at least monthly than students in schools with positive sense of belonging to school.

Students in schools with higher school mean father's SES were about 1.24 times as likely in Grade 9 to drink at least monthly than students in schools with lower school mean father's SES.

Summary on drinking at least monthly. The most important variables at the student level were academic status (Grades 7 to 10) and gender (Grade 7). The effect of academic status starts small in Grade 7, peaks in Grade 8 and then declines (Grades 8 to 10). Both academic status and age showed effects in four out of five grade levels (Grades 7 to 10). The most important variables at the school level were sense of belonging to school (Grades 6 to 8) and negative circle of friends (Grades 8 to 10). The effect of sense of belonging to school peaks in Grade 7. The effect of negative circle of friends increases across grades. Both sense of belonging to school and negative circle of friends showed effects in three out of five grade levels (see above).

Drunken at least once. Table 3 indicates that male students in Grade 8 were about 1.45 times as likely (1 ÷ 0.69) to get drunk (see Appendix 1 for description of the outcome measure) than female students.

Older students were more likely to get drunk than younger students (in the same grade level). Consider two students one month apart in age. The older student was about 1.03 times as likely in Grade 7, about 1.05 times as likely in Grade 8, about 1.05 times as likely in Grade 9 and about 1.02 times as likely in Grade 10 to get drunk than the younger student.

Students with high mother's SES were about 1.30 times as likely to get drunk in Grade 8 than students with low mother's SES.

Students with low father's SES were about 1.30 times as likely (1 ÷ 0.77) to get drunk in Grade 6 as students with high father's SES.

Students who considered themselves as having lower (or worse) academic status were more likely to get drunk than students who considered themselves as having higher (or better) academic status. Specifically, students considering themselves lower in academic status were about 1.64 times as likely (1 ÷ 0.61) in Grade 6, about 1. 85 times as likely (1 ÷ 0.54) in Grade 7, about 1.79 times as likely (1 ÷ 0.56) in Grade 8, about 1.82 times as likely (1 ÷ 0.55) in Grade 9 and about 1.79 times as likely (1 ÷ 0.56) in Grade 10 to get drunk as students considering themselves higher in academic status.

At the school level (see Appendix 2), students in schools with the presence of a negative circle of friends were about 2.93 times as likely in Grade 9 and about 3.06 times as likely in Grade 10 to get drunk than students in schools with the absence of a negative circle of friends.

Students in schools with negative peer environment were about 3.23 times as likely (1 ÷ 0.31) in Grade 7 to get drunk than students in schools with positive peer environment.

In Grade 8, students in schools where students skipped class more often were about 1.87 times as likely (1 ÷ 0.53) to get drunk than students in schools where students skipped class less often.

Students in schools where they felt safe were about 1.85 times as likely in Grade 9 to get drunk than students in schools where they felt unsafe.

In Grade 7, students in schools where child–parent relationship was negative were about 1.92 times as likely (1 ÷ 0.52) to get drunk than students in schools where child–parent relationship was positive.

Students in schools with negative sense of belonging to school were about 2.08 times as likely (1 ÷ 0.48) in Grade 8 to get drunk than students in schools with positive sense of belonging to school.

Summary on getting drunk at least once. The most important variables at the student level were academic status (Grades 6 to 10) and number of parents (Grade 7). The effect of academic status peaks in Grade 7 and then remains similar (Grades 7 to 10). Academic status showed effects in all grade levels (Grades 6 to 10). Age showed effects in four out of five grade levels. The most important variables at the school level were negative circle of friends (Grades 9 and 10) and peer environment (Grade 7). The effect of negative circle of friends remains almost the same across grades. No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Smoking. Table 3 shows that older students were more likely to smoke (see Appendix 1 and note that smoking measures whether students have smoked at least once) than younger students (in the same grade level). Consider two students one month apart in age. The older student was about 1.03 times as likely in Grade 7, about 1.04 times as likely in Grade 8 and about 1.02 times as likely in Grade 9 to smoke than the younger student.

Students living with fewer parents were more likely to smoke than students living with more parents. Students from single-parent households were about 1.79 times as likely (1 ÷ 0.56) in Grade 7 and about 1.69 times as likely (1 ÷ 0.59) in Grade 9 to smoke than students from both-parent households.

Students who considered themselves as having lower (or worse) academic status were more likely to smoke than students who considered themselves as having higher (or better) academic status. Specifically, students considering themselves lower in academic status were about 1.56 times as likely (1 ÷ 0.64) in Grade 6, about 1.47 times as likely (1 ÷ 0.68) in Grade 7, about 2.04 times as likely (1 ÷ 0.49) in Grade 8, about 1.72 times as likely (1 ÷ 0.58) in Grade 9 and about 1.92 times as likely (1 ÷ 0.52) in Grade 10 to smoke than students considering themselves higher in academic status.

At the school level (see Appendix 2), students in schools with the absence of a positive circle of friends were about 2.13 times as likely (1 ÷ 0.47) in Grade 8 to smoke than students in schools with the presence of a positive circle of friends.

Students in schools with the presence of a negative circle of friends were about 2.25 times as likely in Grade 8, about 2.83 times as likely in Grade 9 and about 2.61 times as likely in Grade 10 to smoke than students in schools with the absence of a negative circle of friends.

In Grade 7, students in schools where child–parent relationship was negative were about 1.54 times as likely (1 ÷ 0.65) to smoke than students in schools where child–parent relationship was positive.

Students in schools with low parental involvement were about 2.86 times as likely (1 ÷ 0.35) in Grade 6 and about 2.22 times as likely (1 ÷ 0.45) in Grade 9 to smoke than students in schools with high parental involvement.

Students in schools with negative sense of belonging to school were about 1.89 times as likely (1 ÷ 0.53) in Grade 6 and about 2.94 times as likely (1 ÷ 0.34) in Grade 7 to smoke than students in schools with positive sense of belonging to school.

Students in schools with lower school mean mother's SES were about 1.45 times as likely (1 ÷ 0.69) in Grade 6 to smoke than students in schools with higher school mean mother's SES.

Summary on smoking. The most important variables at the student level were academic status (Grades 6 to 10) and number of parents (Grades 7 and 9). The effect of academic status peaks in Grade 8, and it is relatively larger in the later grades (Grades 9 and 10) than in the earlier grades (Grades 6 and 7). The effect of number of parents remains similar across grades. Academic status showed effects in all grade levels (Grades 6 to 10). Age showed effects in three out of five grade levels. The most important variables at the school level were negative circle of friends (Grades 8 to 10), sense of belonging to school (Grades 6 and 7) and parental involvement (Grades 6 and 9). The effect of negative circle of friends remains similar across grades. The effect of sense of belonging to school increases across grades. The effect of parental involvement is greater in Grade 6 than in Grade 9. Negative circle of friends showed effects in three out of five grade levels (Grades 8 to 10).

Smoking every day. Table 3 shows significant gender differences in smoking every day (see Appendix 1 for description of the outcome measure). Female students were about 2.18 times as likely in Grade 8 and about 1.90 times as likely in Grade 10 to smoke daily than male students.

Older students were more likely to smoke daily than younger students (in the same grade level). Consider two students one month apart in age. The older student was about 1.21 times as likely in Grade 6, about 1.06 times as likely in Grade 8, about 1.06 times as likely in Grade 9 and about 1.02 times as likely in Grade 10 to smoke daily than the younger student.

Students living with fewer parents were more likely to smoke than students living with more parents. Students from single-parent households were about 2.50 times as likely (1 ÷ 0.40) in Grade 7 to smoke daily than students from both-parent households.

Students who considered themselves as having lower (or worse) academic status were more likely to smoke daily than students who considered themselves as having higher (or better) academic status. Specifically, students considering themselves lower in academic status were about 2.22 times as likely (1 ÷ 0.45) in Grade 7, about 2.70 times as likely (1 ÷ 0.37) in Grade 8, about 2.00 times as likely (1 ÷ 0.50) in Grade 9 and about 2.08 times as likely (1 ÷ 0.48) in Grade 10 to smoke daily than students considering themselves higher in academic status.

At the school level (see Appendix 2), students in schools with the presence of a negative circle of friends were about 6.81 times as likely in Grade 8, about 3.84 times as likely in Grade 9 and about 3.55 times as likely in Grade 10 to smoke daily than students in schools with the absence of a negative circle of friends.

In Grade 6, students in schools where school rules were unfair were about 12.50 times as likely (1 ÷ 0.08) to smoke daily than students in schools where school rules were fair.

In Grade 7, students in schools where child–parent relationship was negative were about 1.96 times as likely (1 ÷ 0.51) to smoke daily than students in schools where child–parent relationship was positive.

Students in schools with lower school mean mother's SES were about 1.33 times as likely (1 ÷ 0.75) in Grade 8 to smoke daily than students in schools with higher school mean mother's SES.

Students in schools with lower school mean father's SES were about 1.89 times as likely (1 ÷ 0.52) in Grade 7 and about 1.19 times as likely (1 ÷ 0.84) in Grade 10 to smoke daily than students in schools with higher school mean father's SES.

Summary on smoking every day. The most important variables at the student level were academic status (Grades 7 to 10) and number of parents (Grade 7). The effect of academic status peaks in Grade 8 and is similar in other grades (Grades 7, 9 and 10). Academic status showed effects in four out of five grade levels (Grades 7 to 10). Age showed effects in three out of five grade levels (Grades 8 to 10). The most important variables at the school level were negative circle of friends (Grades 8 to 10) and school rules (Grade 6). The effect of negative circle of friends peaks in Grade 8 and is similar in other grades (Grades 9 and 10). Negative circle of friends showed effects in three out of five grade levels (Grades 8 to 10).

Number of cigarettes smoked weekly. Table 3 shows significant gender differences in number of cigarettes smoked weekly. Female students smoked 3–4 more cigarettes weekly than male students in Grade 8.

Older students smoked more cigarettes weekly than younger students (in the same grade level). Consider two students one month apart in age. The older student smoked about 0–1 more cigarette than the younger student across all grade levels.

Students living with fewer parents smoked more cigarettes weekly than students living with more parents. Students from single-parent households smoked about 3–4 more cigarettes in Grade 8 than students from both-parent households.

Students who considered themselves as having lower (or worse) academic status smoked more cigarettes weekly than students who considered themselves as having higher (or better) academic status. Specifically, students considering themselves lower in academic status smoked about 1–2 more cigarettes weekly in Grade 7, about 3–4 more cigarettes weekly in Grade 8, about 5–6 more cigarettes weekly in Grade 9 and about 6–7 more cigarettes weekly in Grade 10 than students considering themselves higher in academic status.

At the school level (see Appendix 2), students in schools with the presence of a negative circle of friends smoked about 4–5 more cigarettes weekly in Grade 8 and about 8–9 more cigarettes weekly in both Grades 9 and 10 than students in schools with the absence of a negative circle of friends.

Students in schools with negative peer environment smoked about 0–1 more cigarette weekly than students in schools with positive peer environment.

Students in schools where they felt unsafe smoked 3–4 more cigarettes weekly in Grade 8 than students in schools where they felt safe.

In Grade 6, students in schools where child–parent relationship was negative smoked 0–1 more cigarette weekly than students in schools where child–parent relationship was positive.

Students in schools with negative sense of belonging to school smoked about 2–3 more cigarettes weekly in Grade 7 than students in schools with positive sense of belonging to school.

Students in schools with lower school mean father's SES smoked about 2–3 more cigarettes weekly in Grade 10 than students in schools with higher school mean father's SES.

Summary on number of cigarettes smoked weekly. The most important variables at the student level were academic status (Grades 7 to 10) and gender (Grade 8). The effect of academic status increases substantially across grades. Academic status showed effects in four out of five grade levels (Grades 7 to 10). The most important variables at the school level were negative circle of friends (Grades 8 to 10) and school safety (Grade 8). The effect of negative circle of friends peaks in Grades 9 and 10. Negative circle of friends showed effects in three out of five grade levels (Grades 8 to 10).

Injury

Table 4 presents descriptive statistics for the two outcome measures (see Appendix 1) on injury, including injured at least once with medical treatment (mirroring serious injury) and injured at least once without medical treatment (mirroring minor injury). Both the proportion of students injured with medical treatment and the proportion of students injured without medical treatment were similar across grades.

Table 5 presents estimated probabilities for the typical student on injury. The typical student was about 33% likely in Grade 6, about 41% likely in Grade 7, about 42% likely in Grade 8, about 45% likely in Grade 9 and about 41% likely in Grade 10 to have injury at least once that needed medical treatment.

The typical student was about 37% likely in Grade 6, about 42% likely in Grade 7, about 41% likely in Grade 8, about 42% likely in Grade 9 and about 38% likely in Grade 10 to have injury at least once that did not need medical treatment.

Injured at least once with medical treatment. Table 6 shows that male students were about 1.52 times as likely (1 ÷ 0.66) in Grade 6 and about 1.25 times as likely (1 ÷ 0.80) in Grade 10 to have serious injury (see Appendix 1 for description of the outcome measure) than female students.

Students with high mother's SES were about 1.14 times as likely in Grade 8 and about 1.21 times as likely in Grade 10 to have serious injury than students with low mother's SES.

Students who considered themselves as having lower (or worse) academic status were more likely to have serious injury than students who considered themselves as having higher (or better) academic status. Specifically, students considering themselves lower in academic status were about 1.33 times as likely (1 ÷ 0.75) in Grade 7, about 1.28 times as likely (1 ÷ 0.78) in Grade 9 and about 1.14 times as likely (1 ÷ 0.88) in Grade 10 to have serious injury than students considering themselves higher in academic status.

At the school level (see Appendix 2), students in schools with the presence of a negative circle of friends were about 1.31 times as likely in Grade 10 to have serious injury as students in schools with the absence of a negative circle of friends.

Students in schools with unfair school rules were about 1.85 times as likely (1 ÷ 0.54) in Grade 8 to have serious injury than students in schools with fair school rules. In Grade 10, however, students in schools with fair school rules were about 1.68 times as likely to have serious injury than students in schools with unfair school rules.

Students in schools with higher school mean mother's SES were about 1.22 times as likely in Grade 10 to have serious injury than students in schools with lower school mean father's SES.

Summary on injury at least once with medical treatment. The most important variables at the student level were gender (Grades 6 and 10) and academic status (Grades 7, 9 and 10). The effect of gender is larger in Grade 6 than in Grade 10. The effect of academic status decreases across grades. Academic status showed effects in three out of five grade levels. The most important variables at the school level were school rules (Grades 8 and 9) and negative circle of friends (Grade 10). No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Injured at least once without medical treatment. Table 6 shows that students who considered themselves as having lower (or worse) academic status were about 1.41 times as likely (1 ÷ 0.71) in Grade 7, about 1.32 times as likely (1 ÷ 0.76) in Grade 9 and about 1.39 times as likely (1 ÷ 0.74) in Grade 10 to have minor injury (see Appendix 1 for description of the outcome measure) than students who considered themselves as having higher (or better) academic status.

At the school level (see Appendix 2), students in schools with fair school rules were about 1.45 times as likely to have minor injury in Grade 9 than students in schools with unfair school rules.

Students in schools where student skipping class was more often were about 1.64 times as likely (1 ÷ 0.61) to have minor injury in Grade 8 than students in schools where student skipping class was less often.

Summary on injury at least once without medical treatment. The most important variable at the student level was academic status (Grades 7, 9 and 10). The effect remains similar across grades. Academic status showed effects in three out of five grade levels (Grades 7, 9 and 10). The most important variables at the school level were student skipping class (Grade 8) and school rules (Grade 9). No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Leisure Activities

Table 7 presents descriptive statistics on students' leisure activities, including watching TV at least 2 hours daily and playing computer games at least 4 hours weekly, exercising every day and exercising at least 7 hours weekly (see Appendix 1).

Table 8 presents estimated probabilities for the typical student on leisure activities. The typical student was about 18% likely in Grade 6, about 22% likely in Grade 7, about 16% likely in Grade 8, about 15% likely in Grade 9 and about 9% likely in Grade 10 to watch TV (at least 2 hours daily) and play computer games (at least 4 hours weekly).

The typical student was about 24% likely in Grade 6, about 26% likely in Grade 7, about 19% likely in Grade 8, about 16% likely in Grade 9 and about 12% likely in Grade 10 to exercise every day.

The typical student was about 17% likely in Grade 6, about 22% likely in Grade 7, about 21% likely in Grade 8, about 18% likely in Grade 9 and about 17% likely in Grade 10 to exercise at least 7 hours weekly.

Watching TV at least 2 hours daily and playing computer games at least 4 hours weekly. Table 9 shows significant gender differences on watching TV and playing computer games (see Appendix 1 for description of the outcome measure). Male students were about 4.00 times as likely (1 ÷ 0.25) in Grade 6, about 4.00 times as likely (1 ÷ 0.25) in Grade 7, about 5.88 times as likely (1 ÷ 0.17) in Grade 8, about 6.67 times as likely (1 ÷ 0.15) in Grade 9, and about 10.00 times as likely (1 ÷ 0.10) in Grade 10 as female students to watch TV and play computer games.

Younger students were more likely to watch TV and play computer games than older students (in the same grade level). Consider two students one month apart in age. The younger student was about 1.03 times as likely (1 ÷ 0.97) in Grade 10 to watch TV and play computer games than the older student.

Students with low father's SES were about 1.33 times as likely (1 ÷ 0.75) in Grade 6 and about 1.18 times as likely (1 ÷ 0.85) in Grade 10 to watch TV and play computer games than students with high father's SES.

Students who considered themselves as having lower (or worse) academic status were about 1.27 times as likely in Grade 9 to watch TV and play computer games as students who considered themselves as having higher (or better) academic status.

At the school level (see Appendix 2), students in schools with the absence of a positive circle of friends were about 2.38 times as likely (1 ÷ 0.42) in Grade 9 to watch TV and play computer games than students in schools with the presence of a positive circle of friends.

Also in Grade 9, students in schools with negative peer environment were about 2.70 times as likely (1 ÷ 0.37) to watch TV and play computer games than students in schools with positive peer environment.

Students in schools with fair school rules were about 1.92 times as likely (1 ÷ 0.52) to watch TV and play computer games in Grade 8 than students in schools with unfair school rules.

Students in schools with negative sense of belonging to school were about 2.04 times as likely (1 ÷ 0.49) to watch TV and play computer games in Grade 10 than students in schools with positive sense of belonging to school.

Summary on watching TV at least 2 hours daily and playing computer games at least 4 hours weekly. The most important variables at the student level were gender (Grades 6 to 10) and father's SES (Grades 6 and 10). The effect of gender increases substantially across grades. The effect of father's SES is similar in both grades. Gender showed effects in all grade levels (Grades 6 to 10). The most important variables at the school level were negative circle of friends (Grade 9), peer environment (Grade 9) and sense of belonging to school (Grade 10). No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Exercising every day. Table 9 shows that male students were about 1.96 times as likely (1 ÷ 0.51) in Grade 6, about 1.59 times as likely (1 ÷ 0.63) in Grade 7, about 1.92 times as likely (1 ÷ 0.52) in Grade 8, about 2.86 times as likely (1 ÷ 0.35) in Grade 9 and about 2.08 times as likely (1 ÷ 0.48) in Grade 10 to exercise every day than female students (see Appendix 1 for description of the outcome measure).

At school-level (see Appendix 2), students in schools with the presence of a negative circle of friends were about 1.60 times as likely to exercise every day in Grade 8 than students in schools with the absence of a negative circle of friends.

Students in schools with positive sense of belonging to school were about 2.14 times as likely to exercise every day in Grade 9 than students in schools with negative sense of belonging to school.

Summary on exercising every day. The most important variable at the student level was gender (Grades 6 to 10). The effect is substantially larger in the later grades than in the earlier grades. Gender showed effects in all grade levels (Grades 6 to 10). The most important variables at the school level were sense of belonging to school (Grade 9) and negative circle of friends (Grade 8). No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Exercising at least 7 hours weekly. Table 9 shows male students were about 1.82 times as likely (1 ÷ 0.55) in Grade 6, about 2.13 times as likely (1 ÷ 0.47) in Grade 7, about 2.38 times as likely (1 ÷ 0.42) in Grade 8, about 3.03 times as likely (1 ÷ 0.33) in Grade 9 and about 2.02 times as likely (1 ÷ 0.45) in Grade 10 to exercise at least 7 hours weekly (see Appendix 1 for description of the outcome measure) than female students.

Students with high mother's SES were about 1.20 times as likely in Grade 9 and about 1.19 times as likely in Grade 10 to exercise at least 7 hours weekly than students with low mother's SES.

Students who considered themselves as having higher (or better) academic status were about 1.31 times as likely in Grade 6 and about 1.32 times as likely in Grade 10 to exercise at least 7 hours weekly than students who considered themselves as having lower (or worse) academic status.

At the school level (see Appendix 2), students in schools with unfair school rules were about 1.49 times as likely (1 ÷ 0.67) to exercise at least 7 hours weekly in Grade 8 than students in schools with fair school rules.

Students in schools with higher school mean mother's SES were about 1.25 times as likely to exercise at least 7 hours weekly in Grade 10 than students in schools with lower school mean mother's SES.

Summary on exercising at least 7 hours weekly. The most important variables at the student level were gender (Grades 6 to 10) and academic status (Grades 6 and 10). The effect of gender becomes substantial in Grade 8 and peaks in Grade 9. The effect of academic status remains almost the same across grades. Gender showed effects in all grade levels (Grades 6 to 10). The most important variables at the school level were school rules (Grade 8) and school mean mother's SES (Grade 10). No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Nutrition

Table 10 presents descriptive statistics on nutrition, including eating breakfast every day, more healthy food score and less healthy food score (see Appendix 1). The proportion of students who ate breakfast every day showed a clear decline across grades.

Table 11 presents estimated probabilities for the typical student on nutrition. The typical student was about 73% likely in Grade 6, about 66% likely in Grade 7, about 57% likely in Grade 8, about 55% likely in Grade 9 and about 48% likely in Grade 10 to eat breakfast every day.

The typical student scored about 12.75 in Grade 6, about 12.50 in Grade 7, about 12.73 in Grade 8, about 12.51 in Grade 9 and about 12.83 in Grade 10 on more healthy food intake.

The typical student scored about 11.42 in Grade 6, about 12.02 in Grade 7, about 12.25 in Grade 8, about 12.54 in Grade 9 and about 12.16 in Grade 10 on less healthy food intake.

Eating breakfast everyday. Table 12 shows that male students were about 1.64 times as likely (1 ÷ 0.61) in Grade 7, about 2.00 times as likely (1 ÷ 0.50) in Grade 8, about 2.27 times as likely (1 ÷ 0.44) in Grade 9, and about 1.96 times as likely (1 ÷ 0.51) in Grade 10 as female students to eat breakfast (see Appendix 1 for description of the outcome measure).

Younger students were more likely to eat breakfast than older students (in the same grade level). Consider two students one month apart in age. The younger student was about 1.01 times as likely (1 ÷ 0.99) in Grade 10 to eat breakfast than the older student.

Students living with more parents were more likely to eat breakfast than students living with fewer parents. In Grade 8, students from both-parent households were about 1.55 times as likely to eat breakfast than students from single-parent households.

Students who considered themselves as having higher academic status were more likely to eat breakfast than students who considered themselves as having lower academic status. Specifically, students considering themselves higher in academic status were about 1.45 times as likely in Grade 7, about 1.46 times as likely in Grade 8, about 1.62 times as likely in Grade 9 and about 1.51 times as likely in Grade 10 to eat breakfast than students considering themselves lower in academic status.

At the school level (see Appendix 2), students in schools with the presence of a positive circle of friends were about 2.28 times more likely to eat breakfast in Grade 9 than students in schools with the absence of a positive circle of friends.

Students in schools where student skipping class was more often were about 1.33 times as likely to eat breakfast in Grade 10 than students in schools where student skipping class was less often.

Students in schools with strong parental involvement were about 2.56 times as likely in Grade 6 and about 1.83 times as likely in Grade 8 than students in schools with weak parental involvement to eat breakfast.

Students in schools with negative sense of belonging to school were about 2.04 times as likely (1 ÷ 0.49) to eat breakfast in Grade 9 than students in schools with positive sense of belonging to school.

Students in schools with lower school mean father's SES were about 1.18 times as likely (1 ÷ 0.85) to eat breakfast in Grade 8 than students in schools with higher school mean father's SES.

Summary on eating breakfast every day. The most important variables at the student level were gender (Grades 7 to 10) and academic status (Grades 7 to 10). The effect of gender starts at moderate in Grade 7 and then becomes considerably large (Grades 8 to 10). The effect of academic status basically remains similar across grades. Both gender and academic status showed effects in four out of five grade levels (Grades 7 to 10). The most important variables at the school level were parental involvement

(Grades 6 and 8) and positive circle of friends (Grade 9). The effect of parental involvement is larger in Grade 6 than in Grade 8. No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

More healthy food score. Table 12 indicates that students with high mother's SES had more "more health food" (see Appendix 1 for description of the outcome measure) than students with low mother's SES (a score difference about 0.26 in Grade 6, about 0.42 in Grade 7, about 0.29 in Grade 9 and about 0.25 in Grade 10).

Students with high father's SES had more "more health food" than students with low father's SES (a score difference about 0.25 in Grade 8).

Students living with more parents had more "more healthy food" than students living with fewer parents. In Grade 10, students from both-parent households scored about 0.38 higher on more healthy food than students from single-parent households.

Students who considered themselves as having higher academic status had more "more healthy food" than students who considered themselves as having lower academic status (a score difference about 0.44 in Grade 6, about 0.33 in Grade 7, about 0.85 in Grade 8, about 0.82 in Grade 9 and about 0.64 in Grade 10).

At the school level (see Appendix 2), students in schools with positive peer environment had more "more healthy food" than students in schools with negative peer environment (a score difference about 1.04 in Grade 6 and about 1.99 in Grade 8).

Students in schools with low academic press had more "more healthy food" than students in schools with high academic press (a score difference about 1.42 in Grade 8).

Students in schools with fair school rules had more "more healthy food" than students in schools with unfair school rules (a score difference about 1.42 in Grade 8).

Students in schools with strong parental involvement had more "more healthy food" than students in schools with weak parental involvement (a score difference about 1.20 in Grade 10).

Students in schools with lower school mean mother's SES had more "more healthy food" than students in schools with higher school mean mother's SES (a score difference about 0.41 in Grade 7). However, in Grade 9, students in schools with higher school mean mother's SES had more "more healthy food" than students in schools with lower school mean mother's SES (a score difference about 0.35).

Summary on more healthy food. The most important variables at the student level were academic status (Grades 6 to 10) and mother's SES (Grades 6, 7, 9 and 10). The effect of academic status peaks in Grade 8 and is relatively larger in the later grades than in the earlier grades. The effect of mother's SES peaks in Grade 7 and is similar in other grades (Grades 6, 9 and 10). Academic status showed effects across all grade levels (Grades 6 to 10). Mother's SES showed effects in four out of five grade levels (Grades 6, 7, 9 and 10). The most important variables at the school level were peer environment (Grades 6 and 8) and academic press (Grade 8). The effect of peer environment is greater in Grade 8 than in Grade 6. No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Less healthy food score. Table 12 shows that male students had more "less healthy food" (see Appendix 1 for description of the outcome measure) than female students (a score difference about 0.95 in Grade 6, about 1.48 in Grade 7, about 0.86 in Grade 8, about 1.45 in Grade 9 and about 1.25 in Grade 10).

In the same grade level, older students had more "less healthy food" than younger students (a score difference about 0.08 in Grade 6, about 0.06 in Grade 8 and about 0.03 in Grade 9).

Students with low mother's SES had more "less healthy food" than students with high mother's SES (a score difference about 0.32 in Grade 6).

Students with low father's SES had more "less healthy food" than students with high father's SES (a score difference about 0.32 in Grade 7, about 0.21 in Grade 9 and about 0.20 in Grade 10).

Students living with fewer parents had more "less healthy food" than students living with more parents. Students from single-parent households scored about 1.02 higher on less healthy food than students from both-parent households in Grade 7. However, in Grade 9, students from both-parent households scored about 0.66 higher on less healthy food than students from single-parent households.

Students who considered themselves as having lower academic status had more "less healthy food" than students who considered themselves as having higher academic status (a score difference about 0.47 in Grade 6, about 0.39 in Grade 7, about 0.71 in Grade 8, about 0.62 in Grade 9 and about 0.60 in Grade 10).

At the school level (see Appendix 2), students in schools with the presence of a negative circle of friends had more "less healthy food" than students in schools with the absence of a negative circle of friends (a score difference about 0.92 in Grade 9 and about 0.66 in Grade 10).

Students in schools where they felt unsafe had more "less healthy food" than students in schools where they felt safe (a score difference about 1.69 in Grade 7).

Students in schools where child-parent relationship was negative had more "less healthy food" than students in schools where child-parent relationship was positive (a score difference about 0.56 in Grade 6).

Students in schools with weak parental involvement had more "less healthy food" than students in schools with strong parental involvement (a score difference about 1.50 in Grade 8).

Students in schools with lower school mean mother's SES had more "less healthy food" than students in schools with higher school mean mother's SES (a score difference about 0.41 in Grade 7).

Summary on less healthy food. The most important variables at the student level were gender (Grades 6 to 10) and academic status (Grades 6 to 10). The effect of gender is larger in Grades 7 and 9 than in other grades (Grades 6, 8 and 10). The effect of academic status is larger in the later grades (Grades 8 to 10) than in the earlier grades (Grades 6 and 7). Both gender and academic status showed effects across all grade levels (Grades 6 to 10). Father's SES showed effects in three out of five grade levels (Grades 7, 9, and 10). The most important variables at the school level were school safety (Grade 7) and parental involvement (Grade 8). No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Dental Hygiene

Table 13 presents descriptive statistics on dental hygiene, including brushing teeth at least twice daily and flossing teeth most days (see Appendix 1). The proportion of students brushing teeth at least twice daily and the proportion of students flossing teeth most days appeared relatively stable across grades.

Table 14 presents estimated probabilities for the typical student on dental hygiene. The typical student was about 67% likely in Grade 6, about 62% likely in Grade 7, about 64% likely in Grade 8, about 72% likely in Grade 9 and about 70% likely in Grade 10 to brush teeth at least twice daily.

The typical student was about 27% likely in Grade 6, about 25% likely in Grade 7, about 28% likely in Grade 8, about 26% likely in Grade 9 and about 21% likely in Grade 10 to floss teeth most days.

Brushing teeth at least twice daily. Table 15 shows that female students were about 1.66 times as likely in Grade 6, about 1.77 times as likely in Grade 7, about 2.06 times as likely in Grade 8, about 2.38 times as likely in Grade 9 and about 3.09 times as likely in Grade 10 as male students to brush teeth at least twice daily (see Appendix 1 for description of the outcome measure).

Younger students were more likely to brush teeth at least twice daily than older students (in the same grade level). Consider two students one month apart in age. The younger student was about 1.03 times as likely (1 ÷ 0.97) in Grade 6 to brush teeth at least twice daily than the older student.

Students with high mother's SES were about 1.19 times as likely in Grade 9 and about 1.13 times as likely in Grade 10 to brush teeth at least twice daily than students with low mother's SES.

Students with high father's SES were about 1.13 times as likely in Grade 10 to brush teeth at least twice daily than students with low father's SES.

Students living with more parents were more likely to brush teeth twice daily than students living with fewer parents. Students from both-parent households were about 1.53 times as likely to brush teeth at least twice daily in Grade 6 than students from single-parent households.

Students who considered themselves as having higher academic status were more likely to brush teeth at least twice daily than students who considered themselves as having lower academic status. Specifically, students considering themselves higher in academic status were about 1.60 times as likely in Grade 6, about 1.31 times as likely in Grade 8 and about 1.28 times as likely in Grade 9 to brush teeth at least twice daily than students considering themselves lower in academic status.

At the school level (see Appendix 2), students in schools with positive peer environment were about 2.50 times as likely to brush teeth at least twice daily in Grade 7 than students in schools with negative peer environment.

Students in schools where student skipping class was more often were about 1.68 times as likely to brush teeth at least twice daily in Grade 6 than students in schools where student skipping class was less often.

Students in schools with positive sense of belonging to school were about 1.73 times as likely to brush teeth at least twice daily in Grade 7 than students in schools with negative sense of belonging to school.

Summary on brushing teeth at least twice daily. The most important variables at the student level were gender (Grades 6 to 10) and academic status (Grades 6, 8 and 9). The effect of gender increases substantially across grades. The effect of academic status decreases across grades. Gender showed effects in all grade levels (Grades 6 to 10). Academic status showed effects in three out of five grade levels. The most important variables at the school level were peer environment (Grade 7) and sense of belonging to school (Grade 7). No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Flossing teeth most days. Table 15 shows that female students were about 1.70 times as likely in Grade 6, about 1.70 times as likely in Grade 7, about 1.69 times as likely in Grade 8, about 2.14 times as likely in Grade 9 and about 2.12 times as likely in Grade 10 as male students to floss teeth most days (see Appendix 1 for description of the outcome measure).

Students living with fewer parents were more likely to floss teeth most days than students living with more parents. Students from single-parent households were about 1.41 times as likely (1 ÷ 0.71) to floss teeth most days in Grade 10 than students from both-parent households.

Students considering themselves higher in academic status were about 1.37 times as likely in Grade 6 to floss teeth most days than students considering themselves lower in academic status.

At the school level (see Appendix 2), students in schools with negative peer environment were about 2.17 times as likely (1 ÷ 0.46) in Grade 8, about 2.00 times as likely (1 ÷ 0.50) in Grade 9 and about 1.85 times as likely (1 ÷ 0.54) in Grade 10 to floss teeth most days than students in schools with positive peer environment.

Students in schools with low academic press were about 2.39 times more likely to floss teeth most days in Grade 6 than students in schools with high academic press.

Students in schools with fair school rules were about 1.74 times as likely to floss teeth most days in Grade 7 than students in schools with unfair school rules.

Summary on flossing teeth most days. The most important variables at the student level were gender (Grades 6 to 10) and number of parents (Grade 10). The effect of gender peaks in the later grades (Grades 9 and 10). Gender showed effects in all grade levels (Grades 6 to 10). The most important variables at the school level were peer environment (Grades 8 to 10) and academic press (Grade 6). The effect of peer environment declines across grades. Peer environment showed effects in three out of five grade levels.

Self

Table 16 presents descriptive statistics for the three outcome measures on self, including feeling helpless at least sometimes, worrying about body image, and self-esteem (see Appendix 1). The proportion of students feeling helpless at least sometimes and the proportion of students worrying about body image gradually increased across grades. Self-esteem scores decreased slightly across grades.

Table 17 presents estimated probabilities for the typical student on self measures. The typical student was about 18% likely in Grade 6, about 17% likely in Grade 7, about 17% likely in Grade 8, about 20% likely in Grade 9 and about 26% likely in Grade 10 to feel helpless at least sometimes.

The typical student was about 28% likely in Grade 6, about 47% likely in Grade 7, about 52% likely in Grade 8, about 59% likely in Grade 9 and about 67% likely in Grade 10 to worry about body image.

The typical student scored about 4.94 in Grade 6, about 4.85 in Grade 7, about 4.85 in Grade 8 and about 4.82 in Grade 9 on self-esteem.

Feeling helpless at least sometimes. Table 18 shows that female students were about 1.70 times as likely in Grade 9 and about 1.90 times as likely in Grade 10 to feel helpless (see Appendix 1 for description of the outcome measure) than male students.

Students with low father's SES were about 1.32 times as likely (1 ÷ 0.76) in Grade 8 to feel helpless than students with high father's SES.

Students living with fewer parents were more likely to feel helpless than students living with more parents. Students from single-parent households were about 1.89 times as likely (1 ÷ 0.53) to feel helpless in Grade 7 than students from both-parent households.

Students considering themselves lower in academic status were about 1.33 times as likely (1 ÷ 0.75) in Grade 6, about 2.00 times as likely (1 ÷ 0.50) in Grade 7, and about 1.35 times as likely (1 ÷ 0.74) in Grade 10 to feel helpless than students considering themselves higher in academic status.

At the school level (see Appendix 2), students in schools with the absence of a positive circle of friends were about 2.17 times as likely (1 ÷ 0.46) to feel helpless in Grade 9 than students in schools with the presence of a positive circle of friends.

Students in schools with the absence of a negative circle of friends were about 1.61 times as likely (1 ÷ 0.62) to feel helpless in Grade 9 than students in schools with the presence of a negative circle of friends.

Students in schools with negative peer environment were about 1.82 times as likely (1 ÷ 0.55) in Grade 10 to feel helpless than students in schools with positive peer environment.

Students in schools with low academic press were about 2.08 times as likely in Grade 6 to feel helpless than students in schools with high academic press.

Students in schools with weak parental involvement were about 2.17 times as likely (1 ÷ 0.46) in Grade 8 to feel helpless than students in schools with strong parental involvement.

Summary on feeling helpless at least sometimes. The most important variables at the student level were academic status (Grades 6, 7 and 10) and gender (Grades 9 and 10). The effect of academic status peaks in Grade 7 and is similar in Grades 6 and 10. The effect of gender is larger in Grade 10 than in Grade 9. Academic status showed effects in three out of five grade levels (Grades 6, 7 and 10). The most important variables at the school level were academic press (Grade 6), parental involvement (Grade 8) and positive circle of friends (Grade 9). No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Worrying about body image. Table 18 shows that female students were about 1.42 times as likely in Grade 6, about 2.11 times as likely in Grade 7, about 2.56 times as likely in Grade 8, about 3.35 times as likely in Grade 9 and about 3.02 times as likely in Grade 10 than male students to worry about their body image (see Appendix 1 for description of the outcome measure).

Younger students were more likely to worry about body image than older students (in the same grade level). Consider two students one month apart in age. The younger student was about 1.02 times as likely (1 ÷ 0.98) in Grades 9 and 10 to worry about their body image than the older student.

Students living with fewer parents were more likely to worry about their body image than students living with more parents. Students from single-parent households were about 1.49 times as likely (1 ÷ 0.67) to worry about their body image in Grade 8 than students from both-parent households.

Students who considered themselves as having lower academic status were about 1.32 times as likely (1 ÷ 0.76) in Grade 6 and about 1.36 times as likely (1 ÷ 0.74) in Grade 7 to worry about their body image than students who considered themselves as having higher academic status.

At school level (see Appendix 2), students in schools with the absence of a positive circle of friends were about 1.69 times as likely (1 ÷ 0.59) in Grade 8 to worry about their body image than students in schools with the presence of a positive circle of friends.

Students in schools with a negative peer environment were about 2.38 times as likely (1 ÷ 0.42) in Grade 9 and about 1.75 times as likely (1 ÷ 0.57) in Grade 10 than students in schools with a positive peer environment to worry about their body image.

Students in schools with low academic press were about 2.39 times as likely in Grade 6, about 2.55 times as likely in Grade 9 and about 2.19 times as likely in Grade 10 to worry about their body image than students in schools with high academic press.

Students in schools where student skipping class was less often were about 1.41 times as likely in Grade 6 to worry about their body image than students in schools where student skipping class was more often.

Students in schools where child–parent relationship was negative were about 1.61 times as likely (1 ÷ 0.62) in Grade 7 and about 1.25 times as likely (1 ÷ 0.80) in Grade 10 to worry about their body image than students in schools where child–parent relationship was positive.

Students in schools with higher school mean father's SES were about 1.27 times as likely in Grade 9 to worry about their body image than students in schools with lower school mean father's SES.

Summary on worrying about body image. The most important variables at the student level were gender (Grades 6 to 10) and number of parents (Grade 8). The effect of gender increases substantially with a peak in Grade 9. Gender showed effects in all grade levels (Grades 6 to 10). The most important variables at the school level were academic press (Grades 6, 9 and 10) and peer environment (Grades 9 and 10). The effect of academic press peaks in Grade 9. The effect of peer environment is greater in Grade 9 than in Grade 10. Academic press showed effects in three out of five grade levels (Grades 6, 9 and 10).

Self-esteem. Table 18 shows that male students had higher self-esteem (see Appendix 1 for description of the outcome measure) than female students (a score difference about 0.43 in Grade 6, about 0.51 in Grade 7, about 0.62 in Grade 8 and about 0.83 in Grade 9).

Younger students had higher self-esteem than older students (in the same grade level). Consider two students one month apart in age. The younger student scored about 0.02 higher in Grades 6 and 7 than the older student on self-esteem.

Students with high mother's SES had higher self-esteem than students with low mother' SES (a score difference about 0.10 in Grade 6).

Students living with more parents had higher self-esteem than students living with fewer parents. Students from both-parent households scored about 0.33 higher in Grade 7 and about 0.38 higher in Grade 8 than students from single-parent households on self-esteem.

Students considering themselves as having higher academic status had higher self-esteem than students considering themselves as having lower academic status (a score difference about 0.48 in Grade 6, about 0.47 in Grade 7 and about 0.31 in Grade 8).

At school level (see Appendix 2), students in school with unfair school rules had higher self-esteem than students in schools with fair school rules (a score difference about 0.39 in Grade 9).

Students in schools where they felt safe had higher self-esteem than students in schools where they felt unsafe (a score difference about 0.43 in Grade 9).

Students in schools where child–parent relationship was positive had higher self-esteem than students in schools where child–parent relationship was negative (a score difference about 0.36 in Grade 6). However, in Grade 7, students in schools where child–parent relationship was negative had higher self-esteem than students in schools where child–parent relationship was positive (a score difference about 0.34).

Students in schools with strong parental involvement had higher self-esteem than students in schools with weak parental involvement (a score difference about 0.64 in Grade 6 and about 0.90 in Grade 8).

Summary on self-esteem. The most important variables at the student level were gender (Grades 6 to 9) and academic status (Grades 6 to 8). The effect of gender increases across grade levels. The effect of academic status decreases across grade levels. Gender showed effects in all grade levels (Grades 6 to 9). Note that Grade 10 data were not used in the analysis due to substantial missing data. Academic status showed effects in three out of four grade levels. The most important variables at the school level were parental involvement (Grades 6 and 8) and school safety (Grade 9). The effect of parental involvement is larger in Grade 8 than in Grade 6. No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Interpersonal Relationships

Table 19 presents descriptive statistics on interpersonal relationships, including having more than two close friends and making friends score (see Appendix 1). The proportion of students having more than two close friends was fairly stable across grades. Students' making friends scores were also fairly consistent across grades.

Table 20 presents estimated probabilities for the typical student on interpersonal relationships. The typical student was about 75% likely in Grade 6, about 78% likely in Grade 7, about 77% likely in Grade 8, about 75% likely in Grade 9 and about 73% likely in Grade 10 to have more than two close friends.

The typical student scored about 3.11 in Grade 6, about 3.16 in Grade 7, about 3.13 in Grade 8, about 3.15 in Grade 9 and about 3.06 in Grade 10 on making friends.

Having more than two close friends. Table 21 shows that students with high mother's SES were about 1.14 times as likely to have more than two close friends (see Appendix 1 for description of the outcome measure) in Grade 10 than students with low mother's SES.

Students with high father's SES were about 1.24 times as likely to have more than two close friends in Grade 7 than students with low father's SES.

At the school level (see Appendix 2), students in schools with the absence of a positive circle of friends were about 1.82 times as likely (1 ÷ 0.55) in Grade 10 to have more than two close friends than students in schools with the presence of a positive circle of friends.

Students in schools with unfair school rules were about 2.27 times as likely (1 ÷ 0.44) in Grade 6 and about 2.13 times as likely (1 ÷ 0.47) in Grade 7 to have more than two close friends than students in schools with fair school rules.

Students in schools with strong parental involvement were about 2.37 times as likely in Grade 8 to have more than two close friends than students in schools with weak parental involvement.

Students in schools with higher school mean mother's SES were about 1.32 times as likely in Grade 6 to have more than two close friends than students in schools with lower school mean mother's SES.

Students in schools with higher school mean father's SES were about 1.34 times as likely in Grade 9 to have more than two close friends than students with lower school mean father's SES.

Summary on having more than two close friends. The most important variables at the student level were mother's SES (Grade 10) and father's SES (Grade 7). No student-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the student level). The most important variables at the school level were school rules (Grades 6 and 7) and parental involvement (Grade 8). The effect of school rules is similar between Grades 6 and 7. No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Making friends score. Table 21 shows that students with high mother's SES made friends more easily (see Appendix 1 for description of the outcome measure) than students with low mother's SES (a score difference about 0.05 in Grade 7 and about 0.04 in Grade 9).

Students considering themselves as having higher academic status made friends more easily than students considering themselves as having lower academic status (a score difference about 0.15 in Grade 6).

At the school level (see Appendix 2), students in schools with high academic press made friends more easily than students in schools with low academic press (a score difference about 0.29 in Grade 8).

Students in schools where student skipping class was less often made friends more easily than students in schools where student skipping class was more often (a score difference about 0.18 in Grade 6).

Students in schools with strong parental involvement made friends more easily than students in schools with weak parental involvement (a score difference about 0.21 in Grade 10).

Students in schools with positive sense of belonging to school made friends more easily than students in schools with negative sense of belonging to school (a score difference about 0.20 in Grade 6 and about 0.17 in Grade 10).

Summary on making friends score. The most important variable at the student level was academic status (Grade 6). No student-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the student level). The most important variables at the school level were sense of belonging (Grades 6 and 10) and academic press (Grade 8). The effect of sense of belonging to school is similar between Grade 6 and Grade 10. No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Health

Table 22 presents descriptive statistics on health, including physical health and mental health (see Appendix 1). Both physical and mental health scores increased across grade levels, indicating that students showed increasing problems in physical and mental health.

Table 23 presents estimates for the typical student on health. The typical student scored about 4.48 in Grade 6, about 4.80 in Grade 7, about 5.12 in Grade 8, about 5.39 in Grade 9, and about 5.92 in Grade 10 on physical health.

The typical student scored about 3.21 in Grade 6, about 3.46 in Grade 7, about 3.48 in Grade 8, about 3.57 in Grade 9 and about 4.13 in Grade 10 on mental health.

Physical health. Table 24 shows significant gender differences in physical health. Male students indicated better physical health (see Appendix 1 for description of the outcome measure) than female students across all grade levels (a score difference about 0.92 in Grade 6, about 0.96 in Grade 7, about 0.82 in Grade 8, about 2.04 in Grade 9 and about 2.02 in Grade 10).

Older students reported better physical health than younger students (in the same grade level). Consider two students one month apart in age. The older student scored about 0.04 lower than the younger student in Grade 9.

Students with high father's SES reported better physical health than students with low father's SES (a score difference about 0.28 in Grade 6).

Students living with more parents reported better physical health than students living with fewer parents. Students from both-parent households scored about 0.74 lower in Grade 9 and about 0.60 lower in Grade 10 than students from single-parent households.

Students who considered themselves as having higher (or better) academic status reported better physical health than students who considered themselves as having lower (or worse) academic status (a score difference about 0.69 in Grade 6, about 0.84 in Grade 7, about 0.92 in Grade 8, about 0.75 in Grade 9 and about 0.84 in Grade 10).

At the school level (see Appendix 2), students in schools with the absence of a negative circle of friends reported better physical health than students in schools with the presence of a negative circle of friends (a score difference about 0.73 in Grade 10).

Students in schools with positive peer environment reported better physical health than students in schools with negative peer environment (a score difference about 1.46 in Grade 8 and about 1.00 in Grade 10).

Students in schools where child–parent relationship was positive reported better physical health than students in schools where child–parent relationship was negative (a score difference about 0.46 in Grade 7).

Students in schools with lower school mean mother's SES reported better physical health than students in schools with higher school mean mother's SES (a score difference about 0.32 in Grade 9 and about 0.25 in Grade 10).

Summary on physical health. The most important variables at the student level were gender (Grades 6 to 10) and academic status (Grades 6 to 10). The effect of gender peaks in Grade 9 and remains peaked in Grade 10. The effect of academic status fluctuates across grade levels with the peak in Grade 8. Both gender and academic status showed effects in all grade levels (Grades 6 to 10). The most important variables at the school level were peer environment (Grades 8 and 10) and negative circle of friends (Grade 10). The effect of peer environment is larger in Grade 8 than in Grade 10. No school-level variables showed effects in more than two grade levels (a lack of consistency in effect among variables at the school level).

Mental health. Table 24 shows significant gender differences in mental health. Male students indicated better mental health (see Appendix 1 for description of the outcome measure) than female students across all grade levels (a score difference about 0.59 in Grade 6, about 0.55 in Grade 7, about 0.50 in Grade 8, about 1.31 in Grade 9 and about 1.13 in Grade 10).

Students with high mother's SES reported better mental health than students with low mother's SES (a score difference about 0.20 in Grade 6).

Students with high father's SES reported better mental health than students with low father's SES (a score difference about 0.14 in Grade 10).

Students living with more parents reported better mental health than students living with fewer parents. Students from both-parent households scored about 0.46 lower in Grade 7 and about 0.27 lower in Grade 10 than students from single-parent households.

Students who considered themselves as having higher (or better) academic status reported better mental health than students who considered themselves as having lower (or worse) academic status (a score difference about 0.43 in Grade 6, about 0.57 in Grade 7, about 0.48 in Grade 8, about 0.47 in Grade 9 and about 0.52 in Grade 10).

At the school level (see Appendix 2), students in schools with positive peer environment reported better mental health than students in schools with negative peer environment (a score difference about 1.05 in Grade 8). However, in Grade 9, students in schools with negative peer environment reported better mental health than students in schools with positive peer environment (a score difference about 0.76).

Students in schools where student skipping class was less often reported better mental health than students in schools where student skipping class was more often (a score difference about 1.02 in Grade 6).

Students in schools where they felt safe reported better mental health than students in schools where they felt unsafe (a score difference about 0.85 in Grade 8).

Students in schools where child–parent relationship was positive reported better mental health than students in schools where child–parent relationship was negative (a score difference about 0.44 in Grade 7, about 0.25 in Grade 8, and about 0.46 in Grade 10).

Students in schools with strong parental involvement reported better mental health than students in schools with weak parental involvement (a score difference about 0.76 in Grade 9).

Students in schools with lower school mean father's SES reported better mental health than students in schools with higher school mean father's SES (a score difference about 0.19 in Grade 9).

Summary on mental health. The most important variables at the student level were gender (Grades 6 to 10) and academic status (Grades 6 to 10). The effect of gender peaks in Grades 9 and 10. The effect of academic status fluctuates across grade levels. Both gender and academic status showed effects in all grade levels (Grades 6 to 10). The most important variables at the school level were peer environment (Grade 8) and school discipline (Grades 6 and 9). Child–parent relationship showed effects in three out of five grade levels.

V Discussion

In this section, principal findings from data analyses were used to generate policy implications. To implement these policy implications, practical recommendations were offered. These recommendations are either evidence-based or theory-based. For example, there is evidence to show that peer helper programs help build a school social environment where students can concentrate on academic tasks. On the other hand, study buddies programs are theory-based in that the role model theory states that significant peers can substantially influence, shape and modify one's values and behaviours. Note that some recommendations are offered on the basis of common sense, which are loosely classified as theory-based. To maintain the integrity of each outcome category (e.g. substance use, injury, leisure activities), some recommendations are repeated in multiple categories. This arrangement may be convenient for readers who focus only on certain health outcomes.

Some recommendations are more appropriate for elementary than for secondary schools. For example, it is possibie for elementary school staff to monitor peer groups, but it is difficult for secondary school staff to do so because secondary students work mainly on individual timetables and may not meet in the same class frequently enough for teachers to get to know them. However, we still suggest that secondary school staff strive to know their students because many strategies work under the condition of good interpersonal relations between school staff and their students. Home room teachers may need to work with their students a few at a time and in a rotation manner. In addition, it is possible for secondary school staff to replace monitoring students with educating students given that secondary students are much more able than elementary students to judge between being safe and dangerous and between right and wrong.

Studies of school effects on academic outcomes typically show small and inconsistent effects at the school level. This does not mean that schools have small and inconsistent effects on student academic outcomes. Most variance in academic outcomes is "absorbed" by variables at the student level. This is why school effects are interpreted as effects over and above student effects (one of the advantages of multilevel data analysis). School-level variables that can significantly explain the "residual" variance in academic outcomes are truly powerful predictors of student academic outcomes. The same holds true with health outcomes. As a matter of fact, school effects on health outcomes as shown in this study are greater than school effects on academic outcomes as shown in the literature. Therefore, those significant school-level variables with consistent effects across most grade levels are truly powerful and consistent predictors of student health outcomes.

Recent Health Status of Canadian Students

The HBSC database has provided us with a cross-sectional opportunity to examine the patterns of health outcomes and behaviours of Canadian school-aged children. Concerns have arisen about students' substance use (seven outcome measures on use of drugs, alcohol and tobacco). A obvious increasing trend toward substance use has been observed in each and every outcome measure on substance use (seven in total) across grade levels (Grades 6 to 10). Canadian students are increasingly exposed to substance use as they progress through their schooling.

Injury (both serious and minor) shows a slight growth from Grades 6 to 9 with the peak in Grade 9, and injury (both serious and minor) declines slightly at the beginning of senior high school (Grade 10). Leisure activities indicate a critical grade level, the beginning of junior high school (Grade 7) in which all three measures of leisure activities peak. Leisure activities declines slightly and consistently thereafter. This is certainly encouraging for watching display screens, but worrisome for exercising – Canadian students are living an inactive life.

Nutrition status of Canadian students highlights the obvious decline in eating breakfast across grade levels (from Grade 6 to Grade 10). We consider this a national concern. Students' intake of more healthy food and less healthy food basically remains moderate and consistent across grade levels (Grades 6 to 10). Canadian students' dental hygiene remains positive and basically consistent across grade levels (from Grade 6 to Grade 10) on brushing teeth, but the use of dental floss is rare among Canadian students across grade levels (Grades 6 to 10).

Canadian students show substantially increasing concerns about their body image – an obvious increase of worrying from Grade 6 to Grade 10. Meanwhile, their self-esteem declines slightly across grade levels (Grades 6 to 10). Helplessness does not appear to be a serious concern among Canadian students.

Interpersonal relationship is satisfactory among Canadian students. Their chance of having more than two close friends and making new friends looks positive and quite stable across grade levels (from Grade 6 to Grade 10). One of the serious concerns about Canadian students is their health. Both their physical and mental health declines clearly across grade levels (from Grade 6 to Grade 10).

Substance Use

We constructed seven outcome measures on substance use. At the student level, use of drugs is not related to student characteristics in any significant way. Number of parents (in Grade 7) and academic status (in Grade 8) emerge as the single most important predictors of use of alcohol. Drinking at least monthly and drunkenness are not related to student characteristics in any significant way. Academic status emerges as the single most important predictor of smoking (every day) from Grades 7 to 10 (peaking in Grade 8). Number of parents is also a critical predictor of smoking (every day) in Grade 7 with students from single-parent families being more likely to smoke than students from both-parent families. Gender is another critical predictor of smoking (every day) in Grade 8 with female students being more likely to smoke than male students. Academic status emerges as the single most important predictor of the number of cigarettes smoked weekly in Grades 9 and 10. Therefore, Grades 7 and 8 (lower junior high grades) are clearly the critical grade levels for prevention and intervention on substance use. School staff need to target particularly students with low academic status (alcohol and tobacco), students from single-parent households (alcohol and tobacco) and female students (tobacco).

In comparison to student characteristics, substance use is much more strongly related to school experiences. This conclusion highlights the important role of schools in the prevention and intervention on substance use. Characteristics of schools in which students' substance use was minor can be described as (a) positive circle of friends, (b) positive sense of belonging to school, and (c) positive parental support (including child–parent relationship and parental involvement). The single most important school experience that dominated all seven outcome measures on substance use is the negative circle of friends, crucial in all grade levels (Grades 6 to 10). Sense of belonging to school is important in Grades 6 to 8. Parental support is important mainly in Grades 6 and 7. In addition, disciplinary climate shows secondary importance in Grades 6 to 8.

We cannot emphasize enough the importance of the circle of friends. A student who saw friends in his or her social circle use substance joined in the use of substance (including drugs, alcohol and tobacco). Peer influence is crucial therefore, far more powerful than any other element of school climate included in the current study. To reduce substance use in our schools, we recommend that school staff carefully monitor peer groups within the school. This monitoring effort helps school staff identify a number of negative social circles in their school. We suggest that preventing a student from joining a negative social circle is not a root solution to the problem of substance use. Rather, we recommend that school staff strive to reform those existing negative social circles with measures such as substance awareness programs, close adult supervision of negative social circles, reward programs for a substance-free school environment, tough sanctions against substance use with the support of families and communities, and counselling of the leading members of a (negative) social circle. Any school effort in transforming the circle of friends from negative into positive reduces substantially students' use of substance. We recommend a school-wide, long-term campaign of monitoring, intervention, and reinforcement.

What concerns us deeply in the current study is the lack of school experiences (apart from the negative circle of friends) that significantly discouraged students' substance use in the later grades (Grades 9 and 10). This challenges school staff to use positive school climate to reduce students' substance use in the upper junior high and lower senior high grades, but this also signals the importance of early intervention. Fortunately, school experiences did play a critical role in the upper elementary and lower junior high grades. We recommend that school staff strive to promote positive social bonds of students with their school – sense of belonging to school. Sense of belonging to school is a result of students feeling cared about and valued in their schools. We recommend that school staff create opportunities for all students to participate actively in school affairs, such as helping perform lunch duties, helping collect homework assignments, helping arrange field trips, helping supervise younger students in lower grade levels and contributing special talents to school events. Any school effort in improving students' sense of belonging to school reduces their odds of substance use, particularly at the end of elementary school and at the beginning of junior high school.

We also recommend that school staff realize that schools alone cannot resolve the social problem of substance use – many critical players have to join forces. One of them is parents as shown in the current study that parental support is crucial, particularly at the end of elementary school and at the beginning of junior high school. We recommend that school staff establish a network with parents on a school-wide, long-term, parent-involved campaign against substance use. In particular, parents need to be given the opportunity to participate in the decision-making process. Parent councils can play a critical role in a school-wide, long-term campaign again substance use. School nurses can provide workshops for parents on the issue of substance use. Trained parents are in a better position to work with their children on both prevention and intervention. Joint guidance and supervision in school and at home requires coordination and cooperation, which can be achieved by regular, formal teacher–parent conferences or regular, informal teacher–parent contacts. Any school effort in getting parents involved in a school-wide, long-term campaign again substance use helps school staff achieve the goal in a significant way.

Early intervention can also focus on improving school disciplinary climate. We recommend that school staff work toward a school disciplinary environment with fair rules and reinforcement, as well as with fair rewards and sanctions. We recommend that school staff involve student representatives when making school disciplinary rules and developing reinforcement measures. In addition, school staff need to get students' inputs to set up appropriate rewards for discipline and sanctions again non-discipline. All these efforts help create a feeling of fairness of school disciplinary operations among students, which in turn helps reduce students' substance use, particularly at the end of elementary school and at the beginning of junior high school. Maintaining treatment effects thereafter is also important.

The notion of "communal schools" can also help school staff alleviate the social problem of substance use. In contrast to traditional schools where school operation is centred around rules and regulations, communal schools operate on the basis of relationship and mutual respect. School staff need to listen to students and treat students with respect; they need to involve students in a meaningful manner in the decision-making process; and they need to promote care and respect among the student body (peer helper programs and peer conflict resolution programs are good examples). Other mechanisms such as "safe school committees" and "school health committees" also help improve general school climate and target specific campus problems. Communal schools operate these committees with a meaningful involvement of community leaders, social workers, parents and students.

The finding that students in schools with higher academic press were more likely to use drugs and alcohol in Grade 10 requires some discussion. We suggest that an over-emphasis on academic achievement (common among senior high schools) burns students out. Drugs and alcohol are likely ways to cope with their academic pressure. We recommend that school staff keep frequent, close contacts with their students to find out their stress levels associated with academic press. More relevant homework assignments (in reduced amount), individual tutoring by teachers and advanced, capable students, and cooperative learning among students can often help students resolve difficulties in their learning. Frequent, close contacts with students also allow school staff to identify those in need of counselling and those in need of (curriculum) stream adjustment.

We suggest that school staff (a) work to reform negative social circles in their school and (b) implement early intervention and maintain its treatment effect. A school-wide, long-term campaign is necessary if schools expect any significant impact on students' substance use. All the above recommendations work better in the presence of school social programs that increase students' awareness and coping strategies of substance use. School staff need to help students develop appropriate social skills and life skills through curricular and extracurricular programs to deal with substance use. School staff need to help students in transition from elementary to secondary schools or students in transfer from one school to another. The buddy program where students coming to a new school are paired with students already in the school helps create a smooth transition. Programs that promote student representation on the parent council, school council and department heads council involve students in a meaningful manner in decision-making processes within the school. This increases the fairness of school operation and the feeling of involvement and participation. All these prevention programs need to be accompanied by proper enforcement measures, such as anti-drug contracts, drug-free rewards and counselling programs.

Injury

Overall, student injury (either serious or minor) is not closely associated with their individual characteristics and their school experiences. At the student level, compared with female students, male students are most vulnerable for serious injury in Grade 6. At the school level, disciplinary climate emerges in Grades 8 and 9 as the strongest predictor of student injury. However, the finding is that students in schools with both good and poor disciplinary climate can be injured. Thus, safety education is necessary regardless of students' individual and school background. The HBSC data did not allow us to identify the cause of injury. We, thus, recommend that school staff find out causes of students' injuries. The point is to make sure that injuries which occurred in schools with poor disciplinary climate are not due to serious causes, such as bullying and fighting. For injuries which occurred in schools with good disciplinary climate, school staff need to identify whether they occur inside school or outside school. If injuries occur inside school, students are likely practising unsafe activities (e.g, games involving chasing and pushing). Adult supervision in the hallway and on the playground can substantially reduce incidents of injuries in school. If injuries occur outside school, parents need to be informed that multiple students have been injured outside school. Parental attention and supervision can then be emphasized to prevent further incidents of injuries outside school.

Leisure Activities

At the student level, gender emerges as the single strongest predictor of leisure activities (across all three measures). Male students spent substantially more time watching display screens than female students, with the gender gap increasing significantly from Grade 6 to Grade 10. Compared with female students, male students are most vulnerable to display screens in Grade 10 (about 10 times as likely as female students). We suggest that school staff target male students for watching display screens as soon as they get into junior high schools. On the other hand, female students spent substantially less time in physical activities than male students, with the gender gap peaking in Grades 9 and 10. Compared with male students, female students are most vulnerable to have an inactive lifestyle in Grade 9. We suggest that school staff target female students for physical activities as soon as they get into junior high schools.

Effects of school experiences on students' leisure activities did not appear until Grade 8, and schools made a difference in students' leisure activities in Grades 8 to 10 (upper junior high and lower senior high grades). There is public concern about students' watching display screens excessively. We suggest that schools can help alter this unhealthy lifestyle. Characteristics of effective schools in which students spent less time on display screens can be described as (a) positive peer influence (including positive circle of friends and peer environment), (b) fair school rules and (c) positive sense of belonging to school. Fair school rules are important in Grade 8, peer influence emerges as the strongest predictor of watching display screens in Grade 9 and sense of belonging to school is important in Grade 10. Therefore, school staff may intervene in upper junior high grades to change students' behaviours of watching display screens, and may specifically target Grade 9 as the critical grade level for behaviour change through creating positive peer influence.

We recommend that school staff pay close attention to leisure activities within peer groups. School staff can obtain a general picture of students' leisure activities through, for example, simple questionnaires and informal chats with students and parents. This information helps school staff to develop extracurricular activities that reduce students' watching display screens, such as academic clubs, technology clubs, arts clubs and sports activities. Schools need to develop adequate extracurricular programs and encourage students to participate in them.

We suggest that when students see fairness of school rules and have sense of belonging to school, they spend more time on school activities rather than going home or to the mall to watch display screens. We recommend that school staff make every effort to make students feel at home in school. To achieve fairness of school rules, students can be involved in making those rules. To achieve sense of belonging to school, students need to feel cared and valued in their school. Students usually feel proud and valued when they help perform lunch duties, collect homework assignments, organize field trips, supervise younger students in lower grade levels and contribute special talents to school events. We suggest that fair school rules and sense of belonging to school ensure students' willingness and desire to take part in extracurricular activities that usually take students away from display screens.

When it comes to physical activities, school experiences highlight sense of belonging to school as the single strongest predictor in Grade 9. School staff may target upper junior high grades for change in students' exercising behaviours through creating positive sense of belonging to school. Schools usually offer excellent sport facilities for students to use. We suggest, however, that unless students have positive sense of belonging to school, they are unlikely to take advantage of those sport facilities.

The positive fact that female students spent a lot less time watching display screens than male students (across all grade levels) is compromised seriously by the negative fact that female students also spent a lot less time in physical activities (in terms of both frequency and duration of physical activities) than male students (across all grade levels). We recommend that physical education teachers realize this situation and organize more physical activities suitable for and interesting to female students. Most physical education teachers are adequately knowledgeable about age-appropriate and gender-appropriate physical activities. We recommend that physical education teachers make effort to make these physical activities available to female students and attract them to participate. Female physical education teachers can set up good examples for female students and lead them to appropriate physical activities.

Finally, there needs to be a recognition on alternative physical activities. In addition to the traditional team-oriented sport activities, we recommend that school staff find out what activities appeal to students (in particular female students). Those activities may be dance, martial arts, or track and field. School staff can then use those activities to attract students.

Nutrition

At the student level, gender emerges as the single strongest predictor of eating breakfast. Male students are significantly more likely to eat breakfast than female students, with the gender gap starting in Grade 7 and peaking in Grade 9 (about 2.27 times as likely as female students). School staff may target female students for eating breakfast as soon as they get into junior high school. Student background characteristics are not important predictors of "more healthy food" intake, but gender emerges as the single strongest predictor of "less healthy food" intake in Grades 9 and 10, in which male students consumed significantly more "less healthy food" than female students. School staff may target male students for "less healthy food" intake in upper junior high and lower senior high grades.

Effective schools where students reported better nutrition can be characterized as having (a) strong parental support (including child–parent relationship and parental involvement) and (b) positive peer influence (including negative circle of friends and peer environment). Parental support is important in Grades 6, 8 and 10. Peer influence is important in Grades 6, 8, 9 and 10. Disciplinary climate (including skipping class, school rules and school safety) is also marginally important in Grades 6, 7 and 10. Parental involvement is the single strongest predictor of eating breakfast in upper elementary grades, and school staff may target these grade levels working closely with parents. Peer environment is the single strongest predictor of "more healthy food" intake in lower junior high grades, and school safety is the single strongest predictor of "less healthy food" intake in lower junior high grades. School staff may intervene on nutrition patterns as soon as students get into junior high school.

It comes as no surprise that parental support is crucial in students' nutrition status. After all, most students have at least two meals at home. We recommend that school staff convey effectively to parents the importance of proper nutrition through, for example, school newsletters and teacher-parent conferences. The parent council can also play an active role in passing the message to parents. School nurses can develop balanced and easy-to-manage meal menus for students at a certain age, and these menus can be sent home to help parents prepare meals for their children.

School lunch menus (mostly set up by schools) have been criticized in the United States for being high in fat. Changing school lunch menus is perhaps the simplest educational intervention on students' health because most school lunch menus are indeed set up by schools. We recommend that school staff work with school nurses and nutrition experts to develop healthy lunch menus in school (including snacks available in school). This effort, in conjunction with strong parental support, will effectively improve students' nutrition status and develop their healthy eating patterns.

In addition, we recommend that school staff get the message of nutrition out to students through, for example, workshops on nutrition, field trips to food manufacturers, and "nutrition clinics" where school nurses help students decide on proper food items. These efforts can influence members of peer groups. Given that peer influence is important on students' nutrition status, school nurses can also focus on the leading members of each peer group, letting their changed eating patterns influence other members of the group.

The findings that female students were less likely to have breakfast than male students and that male students took in more "less healthy food" than female students speak out about health concerns for both male and female students. Again, we recommend that school staff work closely with parents to change these unhealthy nutrition patterns. For example, school staff need to report female students' behaviours, such as having low energy in the morning and consuming sugar-rich snacks in the morning, to parents immediately and give them encouragement to monitor their children's breakfast. School staff can also encourage parents to limit snack allowance, or to offer healthy snacks directly to male students to help reduce their intake of less healthy food.

The current school health education curriculum has inadequate coverage on nutrition education. Unless curricular changes in health education come in soon, school staff may have to rely on extracurricular activities to teach students about, for example, food purchasing, care, handling, and preparation. Other strategies may be hallway and classroom posters that inform students about nutrition facts and healthy eating.

Dental Hygiene

At the student level, gender emerges as the single strongest predictor of dental hygiene. Female students are significantly more likely to brush and floss teeth than male students, with the gender gap increasing consistently across grade levels (about 3.09 times as likely to brush teeth and about 2.12 times as likely to floss teeth in Grade 10 than male students). Therefore, school staff may target male students for dental hygiene as soon as they get into junior high school.

In the upper elementary and lower junior high grades, school experiences positively promoted dental hygiene. Characteristics of schools in which students showed better dental hygiene can be described as (a) positive disciplinary climate, (b) positive peer environment and (c) positive sense of belonging to school. Aspects of disciplinary climate are important in Grades 6 and 7. Sense of belonging to school is important in Grade 7. But peer environment emerges as the single strongest school-level predictor of dental hygiene in junior high school (Grades 7 to 9). Thus, the current study clearly suggests that school staff may target junior high grades for change in students' dental behaviours.

It seems to us that good dental hygiene in the upper elementary and lower junior high grades is a direct by-product of achieving a school climate conducive to teaching and learning. Disciplinary climate is a basic element of school climate. Peer environment and sense of belonging to school correspond to a positive social environment. These three aspects of school life are often common priorities on the agenda of school staff. We suggest that schools striving to work on these aspects of school climate promote good dental hygiene among their students as a direct by-product.

We are concerned about the fact that students in schools with higher academic press were less likely to floss teeth in the upper elementary grades. Without additional evidence in the research literature, we suspect that this situation is related to academic stress (common when students prepare for junior high school). We recommend two measures. First, school staff need to avoid an over-emphasis on academic work (e.g. excessive homework), leaving adequate room for students to practise personal hygiene (including dental hygiene). Second, school staff need to be more available to students for their academic difficulties. For example, school staff can offer workshops on study skills, time management and stress management.

Another concern of ours is on Grades 8 to 10 when there was only one significant school-level variable – peer environment with large but negative effects only on students' flossing behaviours. This finding describes to us a phenomenon that has not been adequately observed in the research literature; that is, students in schools with negative peer environment were in fact far more likely to floss teeth than students in schools with positive peer environment. We suggest that students learning in negative peer environment in school care more about their physical appearance, perhaps to avoid being the target of social stereotyping (e.g. students may be teased or even bullied because of poor dental hygiene). We recommend that school staff first create awareness of this problem among students and then promote mutual respect and acceptance among students through, for example, cooperative learning projects and study buddies programs. When these efforts work, school staff are encouraged to correct the motivation of students' flossing behaviours.

The consistently better dental hygiene (brushing and flossing) of female students over male students across grade levels raises concern about male students' dental hygiene, particularly in the upper junior and lower senior high grades (when the effect peaked). School staff need to work with male students to make them realize the importance of dental hygiene. Health educators may emphasize dental hygiene, as in school health education curriculum, and school nurses may organize field trips to dentists' offices.

Self

At the student level, academic achievement is the single strongest predictor of feeling helpless. Students with low academic achievement at the beginning of junior high school can be seriously depressed (about 2.00 times as likely to feel helpless in Grade 7). School staff may target low academic achievers for the prevention of helplessness. Students from single-parent households are another target group (about 1.89 times as likely to feel helpless in Grade 7). Intervention may start right after students get into junior high school. In Grades 9 and 10, gender emerges as the important predictor of feeling helpless, with the gender gap increasing from Grades 9 to 10. School staff may target female students in the upper junior and lower senior high grades.

Gender turns out to be the single strongest predictor of worrying about body image. Female students are significantly more likely to worry about body image than male students, with the gender gap consistently increasing across grade levels (peaking in Grade 9 at about 3.35 times as likely). School staff may target female students for worrying about body image as soon as they get into junior high school. Gender also turns out to be the single strongest predictor of self-esteem. Male students show consistently higher self-esteem than female students, particularly in the upper junior and lower senior high grades. School staff may target female students for self-esteem as soon as they get into junior high school.

Characteristics of schools where students developed healthier self-perception can be described as (a) strong parental support (including children–parent relationship and parental involvement), (b) high academic press and (c) peer influence (including positive and negative circles of friends and peer environment). Parental support is important in the earlier grade levels (Grades 6 to 8), academic press is important in Grades 6, 9 and 10) and peer influence is important mainly in the later grade levels (Grades 9 and 10).

We recommend that school staff keep parents informed of students' merits regularly, such as academic achievement, athletic awards, prosocial behaviours and special contributions to school and ask parents to express their appreciation to their children. Students' feeling of worthiness from parents helps them develop positive self-perception. School staff also need to encourage parents to be available when students have social or academic difficulties. Although most parents become less and less able to help with their children's academic work, (e.g., in mathematics) their concern and sympathy, in conjunction with their action trying to find solutions, offer comfort to their children and reduce their children's stress. Any school effort in improving parental support improves students' self-perception in the upper elementary and lower junior high grades.

We suggest that academic press strengthens students' feeling of worthiness, as shown in the current study where students in schools with higher academic press were less likely to feel helpless and worry about their body image. School staff with high academic press listen to the concerns of their students and treat them with care and respect. In this sense, academic press in itself can contribute to how students feel about themselves. We recommend that school staff challenge their students academically and provide students with assistance to achieve higher academic goals. A word of caution is desirable here because an over-emphasis on academic work is likely to increase academic-related stress which may lead students into a helpless state. Therefore, we recommend that school staff set up higher academic goals appropriate to and achievable for their students, and always prepare to help students with their academic difficulties. Students' academic success can then add to their feeling of capability and competence.

We suggest that peer pressure is likely the reason for feeling helpless. We recommend that school staff recognize peer groups (e.g. turn them into clubs) and then organize regular activities that emphasize mutual respect and mutual acceptance within peer groups (clubs). On the basis of mutual respect and mutual acceptance, we recommend that school staff work with students on help-seeking and help-offering behaviours through, for example, engaging in cooperative learning, conducting joint group projects, helping (as a group) younger students in lower grade levels, and participating in some volunteering activities in communities. These efforts can help students understand that seeking help is not shameful and offering help is something to be proud of. Any school effort in improving peer influence improves students' self-perception in the upper junior and lower senior high grades.

Female students seem to be at a greater risk of developing negative self-perception than male students, particularly in the later grade levels (Grades 9 and 10). We recommend that school staff, with the involvement of school nurses, carefully monitor the development of female students in their self-perception through, for example, simple questionnaires and informal chats. School staff can then develop appropriate school-based intervention programs, such as workshops, information sessions and special interest groups (discussions) to help female students realize that their problems are developmental (thus natural and normal) and there are ways to alleviate their problems. For severe cases, school nurses need to recommend counselling services to parents.

The phenomenon that female students worry more than male students about body image may also be an issue of maturation as well as an issue of ideal image. Some research suggests that as their bodies mature, girls tend to grow away from the ideal image whereas boys tend to grow toward the ideal image. The female departure from the ideal image is a source of anxiety to many girls. We suggest that school staff replace myths with facts, educating students about the physical change of their bodies and the potential psychological reaction associated with their maturation. Open discussions on facts associated with ideal physical images can help students understand maturation in relation to health.

The emphasis on problems associated with female students' self-perception does not mean that male students are better off. Male students tend to have more behavioural problems, many of which are related to their self-perception. School-based interventions need to work with both male and female students to promote better self-perception. The current study clearly points out the basic components of effective school-based intervention programs: (a) parental support, (b) academic press (teacher support) and (c) peer support. This indicates that the promotion of healthy self-perception is a joint effort of parents, teachers and peers who need to work together to make academic assistance and social support available. Academic success (resulting from adequate academic assistance) and care and respect (resulting from adequate social support) are perhaps the best remedies for all self-related disorders during adolescence.

Interpersonal Relationships

There is a lack of effects of student-level variables on the well-being of student interpersonal relationships. Specifically, although socio-economic variables are the only statistically significant student-level variables, their effects are too trivial on both having more than two close friends and making friends to have any practical implications. In contrast, school experiences have major impact on student interpersonal relationships.

Effective schools in which students reported more positive interpersonal relationships can be characterized as having (a) positive sense of belonging to school, (b) high academic press and (c) strong parental involvement. Parental involvement and academic press show more important effects on interpersonal relationship than sense of belonging to school.

Our finding that parental involvement helps develop their children's interpersonal relationships is a significant contribution to the research literature. We suggest that parental support allows students not only to make new friends with ease but also to develop close friendship effectively. We recommend that school staff first realize the crucial role that parents play in the development of their students' interpersonal relationships and then work closely with parents to help students develop positive interpersonal relationships. School staff are in a unique position to provide information to parents on their children's social behaviour and relationships at school. This creates opportunities for parents to work with their children. The current study shows that parental effort can significantly improve students' interpersonal relationships in the upper junior and lower senior high grades.

Academic press has many positive effects on schooling outcomes of students, and its positive impact on students' interpersonal relationships is another contribution to the research literature. But we caution school staff that an over-emphasis on academic performance is likely to limit the development of students' interpersonal relationships. We recommend that school staff strike a balance between academic and social activities, leaving room for social relations to develop among students, particularly in junior high school. We believe that positive interpersonal relationships is likely to result in various forms of cooperative learning, which in turn will strengthen students' academic performance.

We recommend that school staff strive to establish a positive student sense of belonging to school as another avenue to help them develop positive interpersonal relationships. To develop positive sense of belonging to school, students have to be able to feel valued in their school. Often, some simple measures, such as performing lunch duties, collecting homework assignments and contributing special talents to school events go a long way in helping students develop positive sense of belonging. Any school effort in improving students' sense of belonging improves their interpersonal relationships, particularly at the beginning of junior and senior high school when students are at a critical point, adapting to a new social environment.

School staff need to pay close attention when students transition to a secondary school or to a new school. Often, this transition is a challenge to all students and may cause difficulties in interpersonal relationships among many students. Some strategies can be used to ease this transition. A home room can be used to house one class for a long enough period so a teacher gets to know those students. A buddy program can be used to link new and old students together. Elementary students can go to visit secondary schools (vice versa) to meet their buddies in social events before school starts, such as a barbecue and a school tour. The older buddy can introduce the new student to clubs, facilities, programs and special attractions. These strategies help build sense of belonging to school for everyone involved in the buddy program.

Concerns have arisen regarding school rules that demonstrated substantial but negative effects on students' interpersonal relationships. This conclusion is largely unsupported in the research literature. We suspect that unfair school rules encourage the formation of circles among the student body. Teaming up may be a way for students to encourage, protect, and comfort one another under unfair school rules – the use of interpersonal relationship in a negative way. We recommend that school staff include student representatives in making school disciplinary rules. Compliance to school rules becomes painless when students have inputs in developing those rules. We see this effort effectively smooth the relationship between school authorities and students, thus avoiding the formation of gang-like friendships for self-protection under unfair school rules.

Another explanation is also possible. When school rules are not tough enough against, for example, bullying among students, it may well encourage the formation of circles among the student body as a way to protect one another. The same is also likely when school rules tolerate conflicts among students. We encourage school staff to examine school rules carefully and make sure that students form groups for progressive rather than conflictive reasons. This again calls for joint participation of staff, parents and students in the development and enforcement of school rules.

Finally, school staff can use various programs to prevent the formation of circles for negative purposes among the student body. Peer conflict resolution programs, peer mediator programs, communication skills programs, and programs that teach basic manners and courtesy are some good examples that make students feel cared for and protected. Meanwhile, programs that focus on assertiveness training are helpful for the victims of school violence.

Health

At the student level, gender emerges as the single strongest predictor of both physical and mental health. The gender gap, in favour of male students in both cases, peaks in Grades 9 and 10. These, therefore, are the critical grade levels when special attention needs to be paid to physical and mental health of female students.

Characteristics of schools in which students were healthier physically and mentally can be described as having (a) positive disciplinary climate, (b) positive child–parent relationship and (c) positive peer environment. Disciplinary climate is important, particularly for mental health, in Grade 6, child–parent relationship is important in Grade 7 and peer environment is important in Grades 8 to 10. Peer environment is the most important school climate variable in terms of health. These results indicate that school climate does have consistent effects on students' physical and mental health (from Grades 6 to 10) and that students' health in Grades 8 to 10 is especially sensitive to school climate (peer environment).

We recommend that school staff develop programs that improve school disciplinary climate, such as reward programs for students without absenteeism and tardiness. Adequate adult supervision in the hallway and on the playground creates a safe environment that reduces health hazards. Any school effort in improving disciplinary climate improves students' health in the upper elementary grades.

We recommend that school staff work closely with parents to help establish positive relationships between children and parents. For example, school staff can promote positive conversations between children and parents through strategies such as a (regular or electronic) mail system that keeps parents informed regularly and promptly of their children's educational achievement (e.g. academic award, excellent performance, prosocial behaviours). Any school effort in improving child–parent relationship improves students' health in the lower junior high grades.

We strongly recommend that school staff pay adequate attention to the characteristics of social groups in their student body. It is ideal if school staff can influence the formation of peer groups. Otherwise, school staff can recognize existing peer groups as, for example, clubs, and organize regular meetings with students in each peer group. Regular discussions within a peer group on issues, such as mutual recognition and reduction of risky behaviours, help not only to eliminate negative elements of the group but also introduce or reinforce positive elements to the group. Any school effort in improving peer environment improves students' health in the upper junior and lower senior high grades.

The fact that female students reported consistently more physical and mental health problems than male students in the current study makes us recommend that school staff monitor the health conditions of female students closely. This monitoring system can take multiple forms, such as records of sick absences, informal chats between school staff and students, regular contacts with parents and even family doctors, and administration of simple health questionnaires. Information generated from this monitoring system helps school nurses organize workshops or seminars to address some health concerns for female students. In case of serious concerns, parents and family doctors can be notified for early treatment or intervention.

Some Discussion on Unexpected Results

There are quite a few unexpected statistical results on use of alcohol. Students with high mother's SES were more likely to (a) have drunk alcohol at least once, (b) drink at least monthly and (c) get drunk at least once than students with low mother's SES. Note also that father's SES has no influence on student drinking behaviours. We suggest that students in families with high mother's SES have easier access, for various reasons, to alcohol than students in families with low mother's SES. The reason for this, we suggest, is that most high SES mothers tend to be heavily occupied by their work, leaving less time to monitor and educate their children on use of alcohol. The lack of influence from fathers indicates that they perhaps hold more liberal views about drinking. Overall, we suggest that mothers have more influence on student drinking behaviours. That students in schools with higher school mean mother's SES were more likely to drink than students in schools with lower school mean mother's SES can be explained similarly.

Students in schools with positive peer environment or in schools where they felt safe were more likely to drink than students in schools with negative peer environment or in schools where they felt unsafe. We suggest that staff in safe schools with positive peer environment may not investigate student drinking behaviours as thoroughly as staff in unsafe schools with negative peer environment where zero tolerance on alcohol is often a school policy and heavily enforced. Finally, we note that most of these effects happened during Grades 8 to 10.

We believe that the fact that students with high mother's SES were more likely to have serious injury than students with low mother's SES also highlights the lack of sufficient care (e.g. supervision and education) for their children on the part of high SES mothers due to the difficulties in balancing family and career. We think that the same holds true with regard to the facts that (a) students in schools with higher school mean mother's SES had less "more healthy food" than students in schools with lower school mean mother's SES and (b) students in schools with higher school mean mother's SES reported more physical problems than students in schools with lower school mean mother's SES.

The fact that students in schools where student skipping class was more often were more likely to eat breakfast and brush teeth than students in schools where student skipping class was less often suggests that eating breakfast and brushing teeth are related to skipping class. When skipping class is a common phenomenon in school, students may give priority to eating breakfast and brushing teeth over being in class on time. This is in contrast with another unexpected result that students in schools with lower school mean father's SES were more likely to eat breakfast than students in schools with higher school mean father's SES. The literature contains abundant evidence to show that high SES fathers are actively involved in their children's education. High SES fathers may well emphasize being in class on time over being late in class due to breakfast.

Some unexpected effects also showed up in self-perception measures. Students in schools with the absence of negative circle of friends were more likely to feel helpless than students in schools with the presence of negative circle of friends. We suspect that this is because of the correlation between the absence of negative circle of friends and the presence of high academic standards. Students lack the social atmosphere to form negative circles of friends in schools where there is a heavy emphasis on academic success. But, often, a heavy emphasis on academic excellence is a source of stress among students (and consequently helplessness).

VI Brief Revisit of Research Literature

Results of the current study in general strongly support the claim that school experiences have profound influences on student health outcomes and behaviours. The effects of school experiences exceeded the effects of student characteristics in almost each and every health outcome measure in the current study (24 in total). Therefore, the current study clearly indicates that school experiences are far more important than student characteristics when it comes to adolescent health outcomes and behaviours.

Specifically, results of the current study support the conceptual framework of psychosocial school environment. Students, like adults, need to appreciate that the world they live in is fair and just. Many variables descriptive of the psychosocial school environment were important in predicting student health outcomes and behaviours. Particularly, all of the three sources of social support (peers, parents and school staff) turned out to be critical for student health outcomes and behaviours. For example, the formation of circles of friends in the student body (often referred to as sub-culture groups) as a result of the student perception of school rules as being unfair as proposed in Buysse (1997), Hawkins et al. (1992) and Jessor (1991) has been confirmed in the current study.

Variables of the current study were identified on the basis of the framework of the determinants of health. Personal characteristics (including gender and academic status), family characteristics (including SES and number of parents) and environmental characteristics (descriptive of school climate in the current study, such as circles of friends and parental involvement) were indeed significant determinants of student health outcomes and behaviours. In general, results of the current study support the proposition that there are underlying multidimensional factors that meaningfully determine the health status of individuals, as stated in the framework of the determinants of health. We found in the current study that this framework of the determinants of health works well with the adolescent population.

School-level variables in the current study emphasized multidimensional climatic characteristics of schools that reinforce student cognitive and affective processes associated with health. As such, results of the current study represent empirical evidence on the aptness of the precede-proceed model of health promotion. Many reinforcing variables at the school level (e.g. fairness of school rules and sense of belonging to school) were found to be important to student health outcomes and behaviours. Therefore, results of the current study support the significance of the reinforcing process as stated in the precede-proceed model of health promotion that, we found, applies well to the adolescent population.

In addition, results of the current study support the health concern about lifestyle choices and risk factors of adolescents. For example, the increasing trend toward substance use, the consistent concern about leisure activities (excessive watching of display screens and lack of exercise), and the decreasing trend in physical and mental health provide additional evidence that the health concern about lifestyle choices and risk factors of adolescents is realistic and timely. There is an urgent need for policymakers to take actions to stop negative trends in student health outcomes and behaviours.

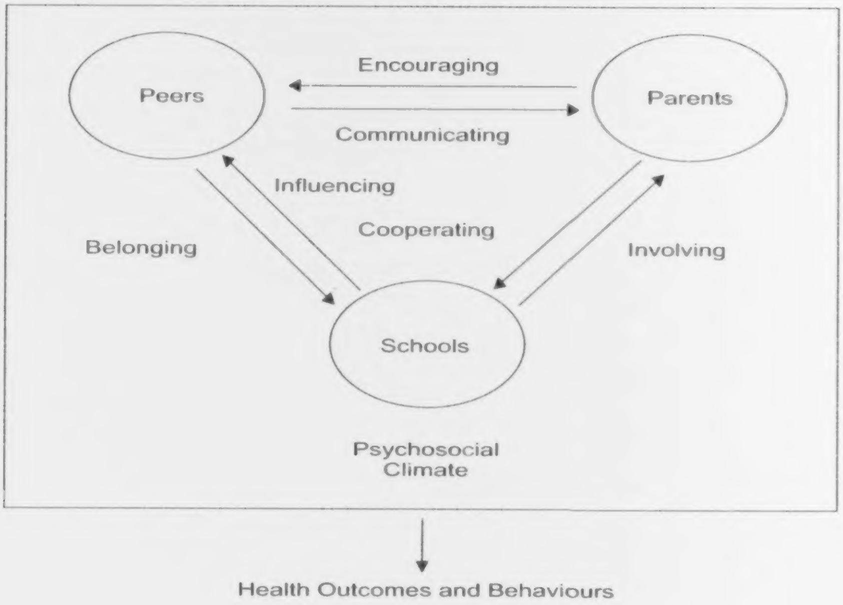
The contribution of the current study to the research literature on adolescent health is far more than the confirmation of previous hypotheses and findings. Results of the current study have provided details to the conceptual framework of psychosocial school environment. We have proposed a school experiences model of health outcomes and behaviours within the psychosocial school environment framework. We have discovered significant relationships among peers, parents and school staff within the psychosocial school environment framework that have been captured in our proposed school experiences model of health outcomes and behaviours (see the next section). The identification of these complex relationships is critical in unfolding the conceptual framework of psychosocial school environment.

Finally, results of the current study have richly extended the research literature on adolescent health. The current study has provided a large amount of new working knowledge for policymaking purposes. For example, critical transition periods (grade levels) for health intervention on many health behaviours have been identified (e.g. behaviours associated with leisure activities). In addition, quite a few findings from the current study have not yet been observed in the research literature (e.g. the critical impact of circles of friends on substance use). These new findings will serve not only to generate new working knowledge but also to indicate new research directions, thus opening many new doors to further investigation into adolescent health outcomes and behaviours. Most findings in the current study have far-reaching theoretical and practical implications.

VII Towards a School Experiences Model of Health Outcomes and Behaviours

Based on results of the current study, we propose a conceptual framework aimed at building a school experiences model of health outcomes and behaviours (see Figure 1). The three components in the heuristic model describe a complex relationship between three major "players" responsible for adolescent health outcomes and behaviours: peers, parents and schools. The overwhelming effects of school experiences (in comparison to the secondary effects of student characteristics) on adolescent health outcomes and behaviours have illustrated the significant role that schools play in promoting positive health outcomes and behaviours of adolescents. Circles of friends (labelled as peers in the model) and parents turn out to be the most important predictors of adolescent health outcomes and behaviours in the current study. Therefore, peers and parents are given significant roles in the model.

Figure 1: A School Experiences Model of Health Outcomes and Behaviors


Encouraging
Peers
Parents
Communicating
Influencing
Cooperating
Belonging
Involving
Schools
Psychosocial Climate
Health Outcomes and Behaviours

We highlight this school experiences model of health outcomes and behaviours using different words describing the interactions among the three parties that affect adolescent health outcomes and behaviours: belonging, influencing, involving, cooperating, encouraging and communicating. These relationships (words) are significantly highlighted in the current study. Peers' positive sense of *belonging* to school improves their health outcomes and behaviours. Schools are not just a means to build knowledge and skills, both cognitive and affective. Schools are also dynamic social institutions, *influencing* strongly the health of students and teachers within the school communities. The interaction between schools and parents are described as *involving* and *cooperating*. Working closely with parents (involving parents) is a significant strategy for school staff to promote positive health outcomes and behaviours of students. Parents should be encourage to cooperate with schools to develop better health outcomes and behaviours of their children. By parents *encouraging* children and children *communicating* with parents, a positive interaction between parents and children at home is developed that affects health outcomes and behaviours of students.

By nature, this school experiences model of health outcomes and behaviours embodies the enabling and reinforcing components of the precede-proceed model of health promotion. We consider our model as a detailed reflection or characterization of the enabling and reinforcing processes in school settings. After all, the teaching and influencing functions of our schools have no match among social institutions that deal with children and adolescents. The school experiences model of health outcomes and behaviours simply emphasizes the significance of these functions for student health outcomes and behaviours.

These interactions among peers, parents, and schools take place in a general background of school psychosocial climate that is shaped by school policies, school programs, and school practices. School psychosocial climate either encourages or hinders those interactions to take place that in turn affect health outcomes and behaviours of students. For example, positive sense of belonging to school can be created through appropriate interactions among students, teachers, and peers in a school psychosocial climate where school programs provide opportunities for students to help teachers and peers (e.g. performing lunch duties, collecting homework assignments, arranging field trips, supervising younger students in lower grade levels, and contributing special talents to school events). Positive sense of belonging to school in turn promotes positive health outcomes and behaviours, such as positive outcomes on leisure activities as reported in the current study.

School staff using this school experiences model of health outcomes and behaviours essentially create a school environment conducive to student health outcomes and behaviours. Studies of this type need to formulate multilevel models to investigate school effects on health outcomes and behaviours of students over and above individual differences of students in health outcomes and behaviours.

VIII Summary of Recommendations

Recommendations for Parents

- Parents participate in a school-wide, long-term, parent-involved campaign against the use of drugs, alcohol and tobacco.
- Parents educate their children and monitor their children's activities outside school to prevent injury.
- Parents convince female children to have breakfast regularly and offer healthy snacks directly (rather than provide snack allowance) to male children to reduce their intake of less healthy food.
- Parents praise their children's school accomplishment (e.g. academic achievement, athletic awards, special talents and prosocial behaviours) to help them reduce the feeling of helplessness, alleviate the worrying about body image and develop positive self-esteem.
- Parents help their children develop interpersonal relationships (e.g. creating opportunities for their children to meet others and instructing their children in interpersonal relationships skills).
- Parents develop harmony relationships with their children to help improve their physical and mental health.

Recommendations for Schools

- School staff target students with low academic status to reduce the use of drugs, alcohol and tobacco, and alleviate the feeling of helplessness.
- School staff target students from single-parent families to reduce the use of drugs, alcohol and tobacco, and alleviate the feeling of helplessness.
- School staff target male students to reduce the time spent on watching display screens and improve dental hygiene.
- School staff target female students to reduce the use of tobacco, increase the amount of physical activities, have breakfast regularly, reduce the feeling of helplessness, alleviate the worrying about body image, develop positive self-esteem and improve physical and mental health.

- The nature of peer groups (circles of friends) is significantly related to the use of drugs, alcohol and tobacco, the time spent on watching display screens, the amount of physical activities, intake of more health food, dental hygiene, the feeling of helplessness, the worrying about body image, and physical and mental health. It is important that school staff influence peer groups and create a positive peer environment (with measures such as awareness programs, close adult supervision of negative social circles, reward programs, tough sanctions with the support of families and communities, and counselling of the leading members of a negative social circle).

- The level of student sense of belonging to school is significantly related to the use of drugs, alcohol and tobacco, the time spent on watching display screens, the amount of physical activities, dental hygiene and interpersonal relationships. It is important that school staff improve student sense of belonging to school (with measures such as performing lunch duties, collecting homework assignments, arranging field trips, supervising younger students in lower grade levels and contributing special talents to school events).

- The level of school disciplinary climate is significantly related to the use of drugs, alcohol, and tobacco, the time spent on watching display screens, the amount of physical activities, dental hygiene, and physical and mental health. It is important that school staff work towards a safe school disciplinary environment with clear and fair rules.

- School staff involve students in the development of school rules.

- School staff monitor student activities inside school to prevent injury.

- School staff develop extracurricular programs to reduce students' time watching display screens.

- School staff make age-appropriate and gender-appropriate physical activities available to female students and attract them to participate.

- School staff work with school nurses and nutrition experts to develop healthy lunch menus in school (including snacks available in school).

- The level of parental involvement is significantly related to the use of drugs, alcohol and tobacco, having breakfast regularly, the feeling of helplessness, the worrying about body image, self-esteem, interpersonal relationship, and physical and mental health. It is important that school staff work closely with parents to improve health outcomes and behaviours of students (with measures such as parent council, workshops for parents on health issues, regular formal teacher–parent conferences and regular informal teacher-parent contacts).

- The level of academic press (academic expectations) is significantly related to the feeling of helplessness, the worrying about body image and interpersonal relationship. It is important that school staff hold high academic expectations for their students and provide the appropriate support for students to achieve them (with measures such as more relevant homework assignments, individual tutoring by teachers, qualified parents and advanced capable students, study buddies programs and cooperative learning among students).

Recommendations for Education Policy

- Restore school health education curriculum to develop adequate health literacy among students – the knowledge, values, attitudes and beliefs necessary for health supportive decision making.

- Provide adequate training for school staff on health promotion and intervention.

- Create (at least) mobile school nurses positions to provide guidance and assistance to school health promotion and intervention.

Recommendations for Public Health Policy

- A family health strategy (focusing on parental awareness, training for parents and parental involvement) is needed to target specific vulnerable groups of students (e.g. students with low academic status and students from single-parent families) to improve health outcomes and behaviours of students.

- A school health strategy (with strong commitment of school staff) is needed to utilize school experiences (e.g. circles of friends, sense of belonging to school, extracurricular activities, and academic press) to influence health outcomes and behaviours of students.

Recommendations for Social Services Policy (Social Support Systems)

- Involve parents and schools in the prevention and intervention of adverse health outcomes and behaviours of students, in particular those related to substance use, self-perception, and interpersonal relationships.
- Provide professional resources to assist parents and schools in their use of family and school experiences to influence health outcomes and behaviours of students.

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Tables

Table 1: Descriptive Statistics on Substance Use, by Grade Levels

Substance use	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	M	SD	M	SD	M	SD	M	SD	M	SD
Proportion of students ever using drugs	0.00	0.00	0.00	0.00	0.23	0.42	0.34	0.47	0.45	0.50
Proportion of students ever using alcohol	0.67	0.47	0.77	0.42	0.82	0.39	0.89	0.32	0.92	0.27
Proportion of students drinking at least monthly	0.08	0.27	0.13	0.34	0.22	0.42	0.34	0.47	0.45	0.50
Proportion of students drunken at least once	0.08	0.27	0.15	0.36	0.27	0.45	0.42	0.49	0.57	0.50
Proportion of students ever smoking	0.20	0.40	0.31	0.46	0.42	0.49	0.56	0.50	0.65	0.48
Proportion of students smoking every day	0.01	0.09	0.04	0.19	0.09	0.29	0.15	0.36	0.20	0.40
Number of cigarettes smoked weekly	0.29	2.15	1.81	10.27	4.52	17.31	7.89	22.75	11.37	27.60

Table 2: Probability of Substance Use for the Typical Student with Nationally Average Characteristics, by Grade Levels

Substance use	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Use of drugs (measuring whether)	0.00	0.00	0.28	0.34	0.45
Use of alcohol (measuring whether)	0.68	0.81	0.84	0.90	0.94
Drinking at least monthly	0.09	0.13	0.23	0.34	0.45
Drunken at least once	0.08	0.14	0.26	0.42	0.58
Smoking (measuring whether)	0.18	0.31	0.44	0.56	0.66
Smoking every day	0.01	0.03	0.07	0.13	0.18
Number of cigarettes smoked weekly (a)	**0.29**	**1.81**	**4.58**	**7.78**	**1.11**

Note: (a) Estimates are not probabilities but numbers of cigarettes smoked weekly.

Table 3: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Substance Use, by Grade Levels

	Use of drugs (a)									
	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	Exp	SE	Exp	SE	Exp	SE	Exp	SE	Exp	SE
Student-level effects										
Age					1.04	0.01	1.05	0.01	1.02	0.01
Number of parents							0.63	0.20	0.75	0.12
Academic status					0.52	0.11	0.54	0.10	0.57	0.06
School-level effects										
Positive circle of friends					0.53	0.29				
Negative circle of friends							2.27	0.20	3.36	0.18
Academic press									0.39	0.25
Fair school rules					0.57	0.26				
	Use of alcohol									
Student-level effects										
Female (vs. male)			0.58	0.18						
Age			1.04	0.01						
Mother's socio-economic status (SES)							1.39	0.12		
Number of parents			0.43	0.25						
Academic status			0.75	0.12	0.47	0.12	0.51	0.16	0.55	0.11
School-level effects										
Negative circle of friends							3.02	0.35	2.43	0.28
Peer environment					3.16	0.32				
Academic press									0.43	0.42
Fair school rules	0.55	0.25								
School safety									2.40	0.34
Sense of belonging to school					0.25	0.30				
School mean mother's SES									1.44	0.15

Table 3: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Substance Use, by Grade Levels (continued)

	Drinking at least monthly									
	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	Exp	SE	Exp	SE	Exp	SE	Exp	SE	Exp	SE
Student-level effects										
Female (vs. male)			0.54	0.23						
Age			1.03	0.01	1.04	0.01	1.03	0.01	1.02	0.01
Mother's SES			1.35	0.12						
Academic status			0.76	0.14	0.62	0.10	0.66	0.08	0.68	0.06
School-level effects										
Negative circle of friends					1.76	0.27	2.21	0.21	2.48	0.16
Child-parent relationship			0.67	0.20						
Sense of belonging to school	0.39	0.37	0.31	0.47	0.47	0.27				
School mean father's SES							1.24	0.08		
	Drunken at least once									
Student-level effects										
Female (vs. male)					0.69	0.17				
Age			1.03	0.01	1.05	0.01	1.05	0.01	1.02	0.01
Mother's SES					1.30	0.09				
Father's SES	0.77	0.11								
Number of parents			0.53	0.21						
Academic status	0.61	0.17	0.54	0.16	0.56	0.12	0.55	0.09	0.56	0.06
School-level effects										
Negative circle of friends							2.93	0.20	3.06	0.17
Peer environment			0.31	0.45						
Student skipping class					0.53	0.26				
School safety							1.85	0.26		
Child-parent relationship			0.52	0.22						
Sense of belonging to school					0.48	0.25				

Table 3: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Substance Use, by Grade Levels (continued)

	Smoking									
	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	Exp	SE	Exp	SE	Exp	SE	Exp	SE	Exp	SE
Student-level effects										
Age			1.03	0.01	1.04	0.01	1.02	0.01		
Number of parents			0.56	0.22			0.59	0.22		
Academic status	0.64	0.13	0.68	0.10	0.49	0.09	0.58	0.09	0.52	0.06
School-level effects										
Positive circle of friends					0.47	0.27				
Negative circle of friends					2.25	0.25	2.83	0.20	2.61	0.14
Child–parent relationship			0.65	0.15						
Parental involvement	0.35	0.51					0.45	0.28		
Sense of belonging to school	0.53	0.27	0.34	0.38						
School mean mother's SES	0.69	0.12								
	Smoking every day									
Student-level effects										
Female (vs. male)					2.18	0.24			1.90	0.14
Age	1.21	0.04			1.06	0.01	1.06	0.02	1.02	0.01
Number of parents			0.40	0.26						
Academic status			0.45	0.20	0.37	0.16	0.50	0.10	0.48	0.07
School-level effects										
Negative circle of friends					6.81	0.28	3.84	0.29	3.55	0.15
Fair school rules	0.08	0.69								
Child–parent relationship			0.51	0.19						
School mean mother's SES					0.75	0.14				
School mean father's SES			0.52	0.19					0.84	0.08

Table 3: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Substance Use, by Grade Levels (continued)

	Number of cigarettes smoked weekly (b)									
	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	Exp	SE	Exp	SE	Exp	SE	Exp	SE	Exp	SE
Student-level effects										
Female (vs. male)					3.29	1.32				
Age	0.05	0.03	0.34	0.09	0.41	0.10	0.43	0.18	0.44	0.14
Number of parents					-3.20	1.79			-5.28	1.96
Academic status			-1.69	0.49	-3.85	0.95	-5.12	0.87	-6.18	0.86
School-level effects										
Negative circle of friends					4.67	1.42	8.72	1.97	8.39	1.99
Peer environment	-0.50	0.20								
School safety					-3.67	1.79				
Child–parent relationship	-0.30	0.13								
Sense of belonging to school			-2.13	1.06						
School mean father's SES									-2.51	0.91

Note: Only statistically significant variables are reported, with 0.05 as the level of significance. Exp denotes the regression result in terms of e raised to the power of each effect, which is the expected change in probability that an event occurs associated with one unit increase in a predictor variable. (a) Use of drugs, as the event of research interest, did not occur in Grades 6 and 7. (b) Estimates are not probabilities but numbers of cigarettes smoked weekly.

Table 4: Descriptive Statistics on Injury, by Grade Levels

Injury	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	M	SD	M	SD	M	SD	M	SD	M	SD
Proportion of students injured at least once with medical treatment	0.34	0.47	0.40	0.49	0.41	0.49	0.44	0.50	0.40	0.49
Proportion of students injured at least once without medical treatment	0.37	0.48	0.39	0.49	0.39	0.49	0.41	0.49	0.38	0.49

Table 5: Probability of Injury for the Typical Student with Nationally Average Characteristics, by Grade Levels

Injury	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Injured at least once with medical treatment	0.33	0.41	0.42	0.45	0.41
Injured at least once without medical treatment	0.37	0.42	0.41	0.42	0.38

Table 6: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Injury, by Grade Levels

	Injured at least once with medical treatment									
	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	Exp	SE	Exp	SE	Exp	SE	Exp	SE	Exp	SE
Student-level effects										
Female (vs. male)	0.66	0.16							0.80	0.10
Mother's socio-economic status (SES)					1.14	0.06	1.21	0.07		
Academic status			0.75	0.10			0.78	0.08	0.88	0.06
School-level effects										
Negative circle of friends									1.31	0.11
Fair school rules					0.54	0.16	1.68	0.21		
School mean mother's SES									1.22	0.07
	Injured at least once without medical treatment (a)									
Student-level effects										
Academic status			0.71	0.08			0.76	0.08	0.74	0.07
School-level effects										
Fair school rules							1.45	0.16		
Student skipping class					0.61	0.20				

Note: Only statistically significant variables are reported, with 0.05 as the level of significance. Exp denotes the regression result in terms of e raised to the power of each effect, which is the expected change in probability that an event occurs associated with one unit increase in a predictor variable. (a) There are no statistically significant variables at the student and school levels in Grade 6.

Table 7: Descriptive Statistics on Leisure Activities, by Grade Levels

Leisure activities	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	M	SD	M	SD	M	SD	M	SD	M	SD
Proportion of students watching TV at least 2 hours daily and playing computer games at least 4 hours weekly	0.20	0.40	0.24	0.43	0.19	0.40	0.19	0.40	0.14	0.35
Proportion of students exercising every day	0.25	0.43	0.26	0.44	0.20	0.40	0.17	0.37	0.13	0.34
Proportion of students exercising at least 7 hours weekly	0.18	0.38	0.21	0.41	0.21	0.41	0.20	0.39	0.18	0.39

Table 8: Probability of Leisure Activities for the Typical Student with Nationally Average Characteristics, by Grade Levels

Leisure activities	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Watching TV at least 2 hours daily and playing computer games at least 4 hours weekly	0.18	0.22	0.16	0.15	0.09
Exercising every day	0.24	0.26	0.19	0.16	0.12
Exercising at least 7 hours weekly	0.17	0.22	0.21	0.18	0.17

Table 9: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Leisure Activities, by Grade Levels

	Watching TV at least 2 hours daily and playing computer games at least 4 hours weekly									
	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	Exp	SE	Exp	SE	Exp	SE	Exp	SE	Exp	SE
Student-level effects										
Female (vs. male)	0.25	0.23	0.25	0.21	0.17	0.25	0.15	0.24	0.10	0.19
Age									0.97	0.01
Father's socio-economic status (SES)	0.75	0.10							0.85	0.07
Academic status							0.79	0.11		
School-level effects										
Positive circle of friends							0.42	0.33		
Peer environment							0.37	0.44		
Fair school rules					0.52	0.23				
Sense of belonging to school									0.49	0.23
	Exercising every day									
Student-level effects										
Female (vs. male)	0.51	0.17	0.63	0.16	0.52	0.21	0.35	0.20	0.48	0.07
School-level effects										
Negative circle of friends					1.60	0.21				
Sense of belonging to school							2.14	0.31		
	Exercising at least 7 hours weekly									
Student-level effects										
Female (vs. male)	0.55	0.21	0.47	0.17	0.42	0.17	0.33	0.16	0.45	0.12
Mother's SES							1.20	0.09	1.19	0.07
Academic status	1.31	0.13							1.32	0.08
School-level effects										
Fair school rules					0.67	0.21				
School mean mother's SES									1.25	0.09

Note: Only statistically significant variables are reported, with 0.05 as the level of significance. Exp denotes the regression result in terms of e raised to the power of each effect, which is the expected change in probability that an event occurs associated with one unit increase in a predictor variable.

Table 10: Descriptive Statistics on Nutrition, by Grade Levels

Nutrition	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	M	SD	M	SD	M	SD	M	SD	M	SD
Proportion of students eating breakfast everyday	0.73	0.45	0.65	0.48	0.57	0.50	0.54	0.50	0.48	0.50
More healthy food score (a)	12.71	3.51	12.49	3.58	12.70	3.68	12.51	3.40	12.45	3.53
Less healthy food score (b)	11.46	3.90	12.01	4.05	12.22	3.79	12.54	3.86	12.15	3.52

Note: (a) More healthy food scale is in a metric of 0–20, with a higher value indicating a more positive outcome. (b) Less healthy food scale is in a metric of 0–24, with a higher value indicating a more negative outcome.

Table 11: Probability of Nutrition for the Typical Student with Nationally Average Characteristics, by Grade Levels

Nutrition	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Eating breakfast every day	0.73	0.66	0.57	0.55	0.48
More healthy food score (a)	12.75	12.50	12.73	12.51	12.38
Less healthy food score (b)	11.42	12.02	12.25	12.54	12.16

Note: (a) Estimates are not probabilities but scores on more healthy food intake (in a metric of 0–20, with a higher value indicating a more positive outcome). (b) Estimates are not probabilities but scores on less healthy food intake (in a metric of 0–24, with a higher value indicating a more negative outcome).

Table 12: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Nutrition, by Grade Levels

	Eating breakfast every day									
	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	Exp	SE	Exp	SE	Exp	SE	Exp	SE	Exp	SE
Student-level effects										
Female (vs. male)			0.61	0.20	0.50	0.14	0.44	0.15	0.51	0.09
Age									0.99	0.01
Number of parents					1.55	0.16				
Academic status			1.45	0.10	1.46	0.09	1.62	0.10	1.51	0.07
School-level effects										
Positive circle of friends							2.28	0.25		
Student skipping class									1.33	0.11
Parental involvement	2.56	0.29			1.83	0.24				
Sense of belonging to school							0.49	0.25		
School mean father's socio-economic status (SES)					0.85	0.07				
	More healthy food score (a)									
Student-level effects										
Mother's SES	0.26	0.11	0.42	0.13			0.29	0.11	0.25	0.07
Father's SES					0.25	0.11				
Number of parents									0.38	0.17
Academic status	0.44	0.15	0.33	0.13	0.85	0.16	0.82	0.12	0.64	0.09
School-level effects										
Peer environment	1.04	0.42			1.99	0.52				
Academic press					1.42	0.48				
Fair school rules									0.82	0.40
Student skipping class	0.94	0.36								
Parental involvement									1.20	0.47
School mean mother's SES			-0.41	0.17			0.35	0.13		

Table 12: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Nutrition, by Grade Levels (continued)

	Less healthy food score (b)									
	Grade 6		**Grade 7**		**Grade 8**		**Grade 9**		**Grade 10**	
	Exp	**SE**	**Exp**	**SE**	**Exp**	**SE**	**Exp**	**SE**	**Exp**	**SE**
Student-level effects										
Female (vs. male)	-0.95	0.24	-1.48	0.26	-0.86	0.27	-1.45	0.27	-1.25	0.16
Age	0.08	0.03			0.06	0.02	0.03	0.02		
Mother's SES	-0.32	0.12								
Father's SES			-0.32	0.13			-0.21	0.09	-0.20	0.06
Number of parents			-1.02	0.34			0.66	0.27		
Academic status	-0.47	0.18	-0.39	0.14	-0.71	0.16	-0.62	0.17	-0.60	0.09
School-level effects										
Negative circle of friends							0.92	0.30	0.66	0.24
School safety			-1.69	0.62						
Child–parent relationship	-0.56	0.25								
Parental involvement					-1.50	0.67				
School mean mother's SES			-0.41	0.18						

Note: Only statistically significant variables are reported, with 0.05 as the level of significance. Exp denotes the regression result in terms of e raised to the power of each effect, which is the expected change in probability that an event occurs associated with one unit increase in a predictor variable. (a) Estimates are not probabilities but scores on more healthy food intake (in a metric of 0–20, with a higher value indicating a more positive outcome). (b) Estimates are not probabilities but scores on less healthy food intake (in a metric of 0–24, with a higher value indicating a more negative outcome).

Table 13: Descriptive Statistics on Dental Hygiene, by Grade Levels

Dental hygiene	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	M	SD	M	SD	M	SD	M	SD	M	SD
Proportion of students brushing teeth at least twice daily	0.65	0.48	0.63	0.48	0.64	0.48	0.71	0.46	0.69	0.46
Proportion of students flossing teeth most days	0.28	0.45	0.25	0.43	0.28	0.45	0.27	0.44	0.22	0.41

Table 14: Probability of Dental Hygiene for the Typical Student with Nationally Average Characteristics, by Grade Levels

Dental hygiene	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Brushing teeth at least twice daily	0.67	0.62	0.64	0.72	0.70
Flossing teeth most days	0.27	0.25	0.28	0.26	0.21

Table 15: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Dental Hygiene, by Grade Levels

	Brushing teeth at least twice daily									
	Grade 6		**Grade 7**		**Grade 8**		**Grade 9**		**Grade 10**	
	Exp	**SE**	**Exp**	**SE**	**Exp**	**SE**	**Exp**	**SE**	**Exp**	**SE**
Student-level effects										
Female (vs. male)	1.66	0.16	1.77	0.18	2.06	0.16	2.38	0.17	3.09	0.11
Age	0.97	0.01								
Mother's socio-economic status (SES)							1.19	0.08	1.13	0.05
Father's SES									1.13	0.05
Number of parents	1.53	0.19								
Academic status	1.60	0.11			1.31	0.10	1.28	0.09		
School-level effects										
Peer environment			2.50	0.38						
Student skipping class	1.68	0.18								
Sense of belonging to school			1.73	0.27						
	Flossing teeth most days									
Student-level effects										
Female (vs. male)	1.70	0.16	1.70	0.17	1.69	0.15	2.14	0.15	2.12	0.11
Number of parents									0.71	0.12
Academic status	1.37	0.13								
School-level effects										
Peer environment					0.46	0.33	0.50	0.30	0.54	0.27
Academic press	2.39	0.31								
Fair school rules			1.74	0.23						

Note: Only statistically significant variables are reported, with 0.05 as the level of significance. Exp denotes the regression result in terms of e raised to the power of each effect, which is the expected change in probability that an event occurs associated with one unit increase in a predictor variable.

Table 16: Descriptive Statistics on Self, by Grade Levels

Self	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	M	SD	M	SD	M	SD	M	SD	M	SD
Proportion of students feeling helpless at least sometimes	0.18	0.39	0.19	0.39	0.19	0.39	0.20	0.40	0.27	0.44
Proportion of students worrying about body image	0.29	0.45	0.44	0.50	0.51	0.50	0.57	0.50	0.65	0.48
Self-esteem score (a)	4.92	1.61	4.85	1.73	4.85	1.66	4.83	1.74		

Note: (a) Self-esteem scale is in a metric of 0–7, with a higher value indicating a more positive outcome, and descriptive statistics are not calculated on self-esteem score in Grade 10 due to a substantial amount of missing values on self-esteem in that grade.

Table 17: Probability of Self for the Typical Student with Nationally Average Characteristics, by Grade Levels

Self	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Feeling helpless at least sometimes	0.18	0.17	0.17	0.20	0.26
Worrying about body image (measuring whether)	0.28	0.47	0.52	0.59	0.67
Self-esteem score (a)	4.94	4.85	4.85	4.82	

Note: (a) Estimates are not probabilities but scores on self-esteem (in a metric of 0–7, with a higher value indicating a more positive outcome), and there is no estimate on self-esteem score in Grade 10 due to a substantial amount of missing values on self-esteem in that grade.

Table 18: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Self, by Grade Levels

	Feeling helpless at least sometimes									
	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	Exp	SE	Exp	SE	Exp	SE	Exp	SE	Exp	SE
Student-level effects										
Female (vs. male)							1.70	0.18	1.90	0.10
Father's socio-economic status (SES)					0.76	0.10				
Number of parents			0.53	0.21						
Academic status	0.75	0.11	0.50	0.12					0.74	0.07
School-level effects										
Positive circle of friends							0.46	0.33		
Negative circle of friends							0.62	0.23		
Peer environment									0.55	0.26
Academic press	2.08	0.37								
Parental involvement					0.46	0.27				
	Worrying about body image									
Student-level effects										
Female (vs. male)	1.42	0.15	2.11	0.17	2.56	0.15	3.35	0.13	3.02	0.11
Age							0.98	0.01	0.98	0.01
Number of parents					0.67	0.15				
Academic status	0.76	0.11	0.74	0.10						
School-level effects										
Positive circle of friends					0.59	0.26				
Peer environment							0.42	0.30	0.57	0.26
Academic press	2.39	0.24					2.55	0.29	2.19	0.28
Student skipping class	0.71	0.16								
Child–parent relationship			0.62	0.16					0.80	0.09
School mean father's SES							1.27	0.10		

Table 18: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Self, by Grade Levels (continued)

	Self-esteem score (a)									
	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	Exp	SE	Exp	SE	Exp	SE	Exp	SE	Exp	SE
Student-level effects										
Female (vs. male)	-0.43	0.09	-0.51	0.11	-0.62	0.11	-0.83	0.10		
Age	-0.02	0.01	-0.02	0.01						
Mother's SES	0.10	0.05								
Number of parents			0.33	0.14	0.38	0.11				
Academic status	0.48	0.06	0.47	0.07	0.31	0.06				
School-level effects										
Fair school rules							-0.39	0.13		
School safety							0.43	0.17		
Child–parent relationship	0.36	0.13	-0.34	0.09						
Parental involvement	0.64	0.24			0.90	0.16				

Note: Only statistically significant variables are reported, with 0.05 as the level of significance. Exp denotes the regression result in terms of e raised to the power of each effect, which is the expected change in probability that an event occurs associated with one unit increase in a predictor variable. (a) Estimates are not probabilities but scores on self-esteem (in a metric of 0–7, with a higher value indicating a more positive outcome), and there is no estimate on self-esteem score in Grade 10 due to a substantial amount of missing values on self-esteem in that grade.

Table 19: Descriptive Statistics on Interpersonal Relationships, by Grade Levels

Interpersonal relationship	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	M	SD	M	SD	M	SD	M	SD	M	SD
Proportion of students having more than two close friends	0.74	0.44	0.79	0.41	0.77	0.42	0.74	0.44	0.73	0.44
Making friends score (a)	3.11	0.84	3.15	0.82	3.13	0.79	3.14	0.74	3.06	0.76

Note: (a) Making friends scale is in a metric of 1–4, with a higher value indicating a more positive outcome.

Table 20: Probability of Interpersonal Relationships for the Typical Student with Nationally Average Characteristics, by Grade Levels

Interpersonal relationship	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Having more than two close friends	0.75	0.78	0.77	0.75	0.73
Making friends score (a)	3.11	3.16	3.13	3.15	3.06

Note: (a) Estimates are not probabilities but scores on making friends (in a metric of 1–4, with a higher value indicating a more positive outcome).

Table 21: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Interpersonal Relationships, by Grade Levels

	Having more than two close friends									
	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	Exp	SE	Exp	SE	Exp	SE	Exp	SE	Exp	SE
Student-level effects										
Mother's socio-economic status (SES)									1.14	0.05
Father's SES			1.24	0.09						
School-level effects										
Positive circle of friends									0.55	0.29
Fair school rules	0.44	0.23	0.47	0.31						
Parental involvement					2.37	0.36				
School mean mother's SES	1.32	0.13								
School mean father's SES							1.34	0.12		
	Making friends score (a)									
Student-level effects			0.05	0.02			0.04	0.03		
Mother's SES										
Academic status	0.15	0.04								
School-level effects										
Academic press					-0.29	0.07				
Student skipping class	-0.18	0.08								
Parental involvement									0.21	0.07
Sense of belonging to school	0.20	0.08							0.17	0.08

Note: Only statistically significant variables are reported, with 0.05 as the level of significance. Exp denotes the regression result in terms of e raised to the power of each effect, which is the expected change in probability that an event occurs associated with one unit increase in a predictor variable. (a) Estimates are not probabilities but scores on making friends (in a metric of 1–4, with a higher value indicating a more positive outcome).

Table 22: Descriptive Statistics on Health, by Grade Levels

Health	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	M	SD	M	SD	M	SD	M	SD	M	SD
Physical health score (a)	4.49	4.05	4.81	3.97	5.11	3.78	5.38	4.00	5.90	4.01
Mental health score (b)	3.21	2.70	3.46	2.63	3.47	2.61	3.55	2.58	4.11	2.73

Note: (a) Physical health scale is in a metric of 0–20, with a higher value indicating a more negative outcome. (b) Mental health scale is in a metric of 0–12, with a higher value indicating a more negative outcome.

Table 23: Probability of Health for the Typical Student with Nationally Average Characteristics, by Grade Levels

Health	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Physical health score (a)	4.48	4.80	5.12	5.39	5.92
Mental health score (b)	3.21	3.46	3.48	3.57	4.13

Note: (a) Physical health score is in a metric of 0–20, with a higher value indicating a more negative outcome. (b) Mental health score is in a metric of 0–12, with a higher value indicating a more negative outcome.

Table 24: Hierarchical Linear Modelling Results Estimating the Effects of Student-level and School-level Variables on Health, by Grade Levels

	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	Effect	SE	Effect	SE	Effect	SE	Effect	SE	Effect	SE
	Physical health score (a)									
Student-level effects										
Female (vs. male)	0.92	0.26	0.96	0.28	0.82	0.24	2.04	0.24	2.02	0.16
Age							-0.04	0.02		
Father's socio-economic status (SES)	-0.28	0.13								
Number of parents							-0.74	0.32	-0.60	0.20
Academic status	-0.69	0.17	-0.84	0.14	-0.92	0.16	-0.75	0.15	-0.84	0.10
School-level effects										
Negative circle of friends									0.73	0.25
Peer environment					-1.46	0.43			-1.00	0.31
Child–parent relationship			-0.46	0.20						
School mean mother's SES							0.32	0.15	0.25	0.11
	Mental health score (b)									
Student-level effects										
Female (vs. male)	0.59	0.15	0.55	0.18	0.50	0.17	1.31	0.16	1.13	0.11
Mother's SES	-0.20	0.09								
Father's SES									-0.14	0.06
Number of parents			-0.46	0.18					-0.27	0.13
Academic status	-0.43	0.12	-0.57	0.10	-0.48	0.09	-0.47	0.10	-0.52	0.07
School-level effects										
Peer environment					-1.05	0.33				
Student skipping class	-1.02	0.31								
School safety							-0.85	0.30		
Child–parent relationship			-0.44	0.17	-0.25	0.12			-0.46	0.08
Parental involvement							0.76	0.24		
School mean father's SES							0.19	0.09		

Note: Only statistically significant variables are reported, with 0.05 as the level of significance. Exp denotes the regression result in terms of e raised to the power of each effect, which is the expected change in probability that an event occurs associated with one unit increase in a predictor variable. (a) Physical health score is in a metric of 0–20, with a higher value indicating a more negative outcome. (b) Mental health score is in a metric of 0–12, with a higher value indicating a more negative outcome.

Appendix 1

Description of Health Outcomes Measures

Use of Drugs

How often have you taken any of the following drugs? (a) Hashish/marijuana (e.g., hash, grass); (b) Solvents (e.g., Glue sniffing); (c) Cocaine (e.g., crack); (d) Heroin/opium/morphine; (e) Amphetamines (e.g., uppers, speed); (f) LSD (e.g., acid); (g) Medical drugs to get stoned (e.g., tranquilizers such as valium or sedatives such as seconal) (0 = Never, 1 = Once or twice, 2 = Three times or more). A dummy variable, named "use of drugs," is created, coded 0 if students register "Never," 1 if students register "Once or twice" or "Three times or more."

Use of Alcohol

Have you ever tasted an alcoholic drink such as beer, wine or liquor (1 = Yes, 2 = No)? A dummy variable, named "use of alcohol", is created, coded 0 if students register "Yes," 1 if students register "No."

Frequency of Drinking

At present, how often do you drink anything alcoholic such as (a) Beer; (b) Wine; (c) Liquor (0 = Never, 1 = Less than once a month, 2 = Every month, 3 = Every week, 4 = Every day)? A dummy variable, named "drinking at least monthly," is created, coded 0 if students register "Never" or "Less than once a month" on (a), (b) and (c), 1 if students register "Every month" or "Every week" or "Every day" on any of (a), (b) and (c).

Drunkenness

Have you ever had so much alcohol that you were really drunk (0 = No, never; 1 = Yes, once; 2 = Yes, 2 to 3 times; 3 = Yes, 4 to 10 times; 4 = Yes, more than 10 times)? A dummy variable, named "drunken at least once," is created, coded 0 if students register "No, never," 1 if students register "Yes, once" or "Yes, 2 to 3 times" or "Yes, 4 to 10 times" or "Yes, more than 10 times."

Use of Tobacco

Have you ever smoked tobacco (at least one cigarette, cigar or pipe) (1 = Yes, 2 = No)? A dummy variable, named "smoking," is created, coded 0 if students register "Yes," 1 if students register "No."

Frequency of Smoking

How often do you smoke tobacco at present (0 = Do not smoke; 1 = Less than once a week; 2 = At least once a week, but not every day; 3 = Every day)? A dummy variable, named "smoking every day," is created, coded 0 if students register "Do not smoke" or "Less than once a week" or "At least once a week, but not every day," 1 if students register "Every day."

Amount of Smoking

If you smoke, how many cigarettes do you smoke in a week? A continuous variable, named "number of cigarettes smoked weekly," is created, based on the responses on the above item.

Injury with Medical Treatment

During the past 12 month, were you hurt or injured and had to be treated by a doctor or a nurse (0 = None, 1 = 1 time, 2 = 2 times, 3 = 3 times, 4 = 4 or more times)? A dummy variable, named "injured at least once with medical treatment," is created, coded 0 if students register "None," 1 if students register "1 time" or "2 times" or "3 times" or "4 or more times."

Injury Without Medical Treatment

During the past 12 months, how many times were you injured so that you missed one full day of school or other usual activities, but were not treated by a nurse or a doctor (0 = None, 1 = 1 time, 2 = 2 times, 3 = 3 times, 4 = 4 or more times)? A dummy variable, named "injured at least once without medical treatment", is created, coded 0 if students register "None", 1 if students register "1 time" or "2 times" or "3 times" or "4 or more times".

Leisure Activity

(a) How many hours a day do you usually watch television (0 = None, 1 = Less than a half hour a day, 2 = Between a half and one hour a day, 3 = 2 to 3 hours a day, 4 = 4 hours a day, 5 = more than 4 hours a day)? (b) How many hours a week do you usually play computer games (including arcade games, Nintendo, Sega) (0 = None, 1 = Less than 1 hour a week, 2 = 1 to 3 hours a week, 3 = 4 to 6 hours a week, 4 = 7 to 9 hours a week, 5 = 10 or more hours a week)? A dummy variable, named "watching television at least 2 hours daily and playing computer games at least 4 hours weekly," coded 0 if students do not register both "2–3 hours a day" or "4 hours a day" or "More than 4 hours a day" for television and "4–6 hours a week" or "7–9 hours a week" or "10 or more hours a week" for computer games, 1 if students register both "2–3 hours a day" or "4 hours a day" or "More than 4 hours a day" for television and "4–6 hours a week" or "7–9 hours a week" or "10 or more hours a week" for computer games.

Frequency of Exercise

Outside school hours in your free time, how often do you exercise so that you get out of breath or sweat (0 = None, 1 = Less than once a month, 2 = Once a month, 3 = Once a week, 4 = 2 to 3 times a week, 5 = 4 to 6 times a week, 6 = Every day)? A dummy variable, named "exercising every day" is created, coded 0 if students register "Never" or "Less than once a month" or "Once a month" or "Once a week" or "2 to 3 times a week" or "4 to 6 times a week," 1 if students register "Every day."

Hours of Exercise

Outside school hours in your free time, how many hours a week do you usually exercise so that you get out of breath or sweat (0 = None, 1 = About a half hour a week, 2 = About 1 hour a week, 3 = About 2 to 3 hours a week, 4 = About 4 to 6 hours a week, 5 = 7 hours or more a week)? A dummy variable, named "exercising at least 7 hours weekly" is created, coded 0 if students register "None" or "About a half hour a week" or "About 1 hour a week" or "About 2 to 3 hours a week" or "About 4 to 6 hours a week," 1 if students register "7 hours or more a week."

More Healthy Food

How often do you drink or eat any of the following? (a) Fruit; (b) Raw vegetables; (c) Cooked vegetables; (d) Whole wheat or rye bread; (e) Low fat milk (1%, 2% or skim) (0 = Never; 1 = Rarely; 2 = At least once a week, but not every day; 3 = Once a day; 4 = More than once a day). A continuous variable, named "more healthy food score," is created, which is the sum of responses over the above items.

Less Healthy Food

How often do you drink or eat any of the following? (a) Coffee; (b) Soft drinks such as colas or other drinks with sugar; (c) Cakes or pastries; (d) Potato chips; (e) French fries; (f) Hamburgers or hot dogs (0 = Never; 1 = Rarely; 2 = At least once a week, but not every day; 3 = Once a day; 4 = More than once a day). A continuous variable, named "less healthy food score," is created, which is the sum of responses over the above items.

Breakfast

How often do you eat breakfast (at least juice and toast or cereal) (0 = Hardly ever or never, 1 = Once a week, 2 = 2 to 3 days a week, 3 = 4 to 6 days a week, 4 = Every day)? A dummy variable, named "eating breakfast every day" is created, coded 0 if students register "Hardly ever or never" or "Once a week" or "2 to 3 days a week" or "4 to 6 days a week," 1 if students register "Every day."

Dental Hygiene (Brushing)

How often do you brush your teeth (0 = Never; 1 = Less than once a week; 2 = At least once a week, but not every day; 3 = Once a day; 4 = More than once a day)? A dummy variable, named "brushing teeth at least twice daily," is created, coded 0 if students register "Never" or "Less than once a week" or "At least once a week, but not every day" or "Once a day," 1 if students register "More than once a day."

Dental Hygiene (Flossing)

How often do you use dental floss (0 = Seldom or never, 1 = At least once a week, 2 = Most days)? A dummy variable, named "flossing teeth most days," is created, coded 0 if students register "Seldom or never" or "At least once a week," 1 if students register "Most days."

Self-esteem

(a) I like myself; (b) I have trouble making decisions; (c) I am often sorry for the things I do; (d) I have confidence in myself (I am sure of myself); (e) I often wish I were someone else; (f) I would change how I look if I could; (g) I often have a hard time saying "no" (1 = Yes, 2 = No). A continuous variable, named "self-esteem score," is created, which is the sum of responses over the above items.

Close Friends

At present, how many close friends do you have (0 = None, 1 = One, 2 = Two, 3 = More than two)? A dummy variable, named "having more than two close friends," is created, coded 0 if students register "None" or "One" or "Two," 1 if students register "More than two."

Making Friends

Is it easy or difficult for you to make new friends (1 = Very easy, 2 = Easy, 3 = Difficult, 4 = Very difficult)? A continuous variable, named "making friends score," is created, based on the responses on the above item.

Helplessness

How often do you feel helpless (0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often, 4 = Always)? A dummy variable, named "feeling helpless at least sometimes," is created, coded 0 if students register "Never" or "Rarely," 1 if students register "Sometimes" or "Often" or "Always."

Physical Health

In the last six months: how often have you had or felt the following? (a) Headache; (b) Stomach ache; (c) Backache; (d) Difficulties in getting to sleep; (e) Feeling dizzy (0 = Seldom or never, 1 = About once every month, 2 = About once every week, 3 = More than once a week, 4 = Most days). A continuous variable, named "physical health," is created, which is the sum of responses over the above items.

Mental Health

In the last six months: how often have you had or felt the following? (a) Feeling low (depressed); (b) A bad mood (irritable); (c) Feeling nervous (uneasy) (0 = Seldom or never, 1 = About once every month, 2 = About once every week, 3 = More than once a week, 4 = Most days). A continuous variable, named "mental health score," is created, which is the sum of responses over the above items.

Body Image

Is there anything about your body you would like to change (1 = Yes, 2 = No)? A dummy variable, named "worrying about body image," is created, coded 0 if students register "No," 1 if students register "Yes."

Appendix 2

Description of School Experiences Measures

Positive Circle of Friends

How many of your friends each statement describes: (a) My friends like school; (b) My friends think getting good marks at school is important; (c) My friends get along with their parents. (0 = None, 1 = A few, 2 = Some, 3 = Most, 4 = All)

Negative Circle of Friends

How many of your friends each statement describes: (a) My friends smoke cigarettes; (b) My friends carry weapons, like knives; (c) My friends use drugs to get stoned; (d) My friends have been drunk. (0 = None, 1 = A few,
2 = Some, 3 = Most, 4 = All)

Peer Environment

(a) The students in my class enjoy being together; (b) Most of the students in my class are kind and helpful; (c) Other students accept me as I am.
(0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often, 4 = Always)

Academic Press

(a) I am encouraged to express my own views in class; (b) Our teachers treat us fairly; (c) When I need extra help from my teachers, I can get it; (d) My teachers show an interest in me as a person; (e) My teachers expect too much of me at school.
(1 = Strongly agree, 2 = Agree, 3 = Neither agree nor disagree, 4 = Disagree,
5 = Strongly disagree)

Fair School Rules

The rules in this school are fair. (1 = Strongly agree, 2 = Agree, 3 = Neither agree nor disagree, 4 = Disagree, 5 = Strongly disagree)

Student Skipping Class

How many days did you skip class or school this term? (0 = 0 days, 1 = 1 day, 2 = 2 days, 3 = 3 days, 4 = 4 or more days)

School Safety

Do you feel safe at school? (0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often, 4 = Always)

Child–Parent Relationships

(a) My parent(s) understand me; (b) I have a happy home life; (c) My parent(s) expect too much of me; (d) My parent(s) trust me; (e) I have a lot of arguments with my parent(s); (f) There are times when I would like to leave home; (g) What my parent(s) think of me is important. (1 = Yes, 2 = No)

Parental Involvement

(a) If I have problems at school, my parent(s) are ready to help me; (b) My parent(s) are willing to come to the school to talk to teachers; (c) My parent(s) encourage me to do well at school. (0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often, 4 = Always)

Sense of Belonging

(a) How do you feel about school at present (1 = I like it a lot, 2 = I like it a little, 3 = I don't like it very much, 4 = I don't like it at all)? (b) Our school is a nice place to be; (c) I feel I belong to this school (1 = Strongly agree, 2 = Agree, 3 = Neither agree nor disagree, 4 = Disagree, 5 = Strongly disagree); (d) How often do you think that going to school is boring (0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often, 4 = Very often)?

Note: Variables presented in the appendices indicate measures of school experiences. Two more variables are also used at the school level to reflect school socio- economic composition: school mean mother's socio-economic status and school mean father's socio-economic status.

Appendix 3

Reliabilities of Outcome Measures and School-level Variables Constructed with Multiple Items

	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10
Health outcome measures					
More healthy food score	0.54	0.57	0.61	0.53	0.61
Less healthy food score	0.73	0.76	0.72	0.73	0.69
Self-esteem score (a)	0.62	0.65	0.61	0.64	
Physical health score	0.69	0.68	0.69	0.70	0.68
Mental health score	0.68	0.65	0.70	0.69	0.72
School-level variables					
Positive circle of friends (b)			0.57	0.53	0.52
Negative circle of friends (c)			0.72	0.70	0.64
Peer environment	0.70	0.70	0.69	0.68	0.70
Academic press	0.71	0.72	0.74	0.71	0.69
Child–parent relationship	0.67	0.79	0.81	0.83	0.82
Parental involvement	0.67	0.73	0.75	0.75	0.73
Sense of belonging to school	0.74	0.76	0.79	0.76	0.74

Note: (a) Reliability is not calculated on self-esteem score in Grade 10 due to substantial amount of missing values on self-esteem in that grade. (b) Data on positive circle of friends are not collected in Grades 6 and 7. (c) Data on negative circle of friends are not collected in Grades 6 and 7.

Appendix 4

Descriptive Statistics on Student-level and School-level Variables, by Grade Levels

	Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	M	SD	M	SD	M	SD	M	SD	M	SD
Student-level variables										
Gender (female)	0.48	0.50	0.46	0.50	0.46	0.50	0.48	0.50	0.54	0.50
Age	1.52	0.06	1.63	0.07	1.76	0.07	1.88	0.07	2.00	0.07
Mother's socio-economic status (SES)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Father's SES	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Number of parents	1.83	0.43	1.81	0.44	1.80	0.44	1.81	0.43	1.81	0.44
Academic status	3.07	0.78	2.93	0.84	2.93	0.83	2.91	0.81	2.84	0.81
School-level variables										
Positive circle of friends					1.18	0.36	1.13	0.39	1.13	0.39
Negative circle of friends					0.57	0.38	1.08	0.53	1.08	0.53
Peer environment	3.68	0.30	3.62	0.31	3.58	0.28	3.62	0.33	3.62	0.33
Academic press	2.08	0.28	2.29	0.29	2.41	0.28	2.49	0.26	2.49	0.26
Fair school rules	3.76	0.46	3.53	0.38	3.37	0.43	3.36	0.45	3.36	0.45
Student skipping class	4.43	0.34	4.36	0.44	4.30	0.41	3.83	0.71	3.83	0.71
School safety	4.10	0.36	3.97	0.30	3.95	0.33	4.07	0.43	4.07	0.43
Child–parent relationship	6.21	0.53	5.88	0.80	5.66	0.67	5.34	0.79	5.34	0.79
Parental involvement	4.39	0.23	4.37	0.24	4.27	0.31	4.18	0.39	4.19	0.39
Sense of belonging to school	3.60	0.34	3.37	0.32	3.18	0.33	3.23	0.29	3.24	0.29
School mean father's SES	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
School mean mother's SES	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00

Note: Age is presented in the number of units, with 100 months as one unit. Mother's SES and father's SES are standardized variables at the student level, and school mean mother's SES and school mean father's SES are standardized variables at the school level. Academic status is measured in a scale of 1–4. Positive circle of friends is measured in a scale of 0–3 (data not collected in Grades 6 and 7). Negative circle of friends is measured in a scale of 0–4 (data not collected in Grades 6 and 7). Peer environment, academic press, fair school rules, student skipping class and school safety are measured in a scale of 1–5. Child–parent relationship is measured in a scale of 0–7. Parental involvement and sense of belonging to school are measured in a scale of 1–5.